

ROADS AND STREETS

Design, Construction, Maintenance and Traffic Control

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Managing Editor

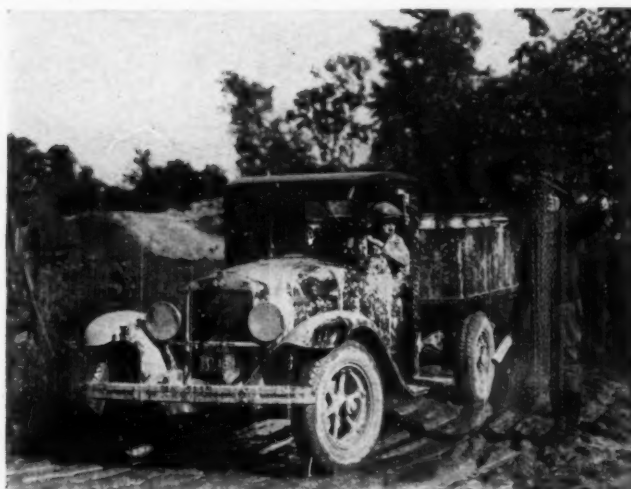
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J. L. LONG
V. J. BROWN
C. M. NELSON
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H. J. CONWAY
Make-up Editor

L. R. VICKERS
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*"The New Road Will
Go Right Through
Here"*

January, 1931

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*See the Road and Street Catalog & Data Book

In addition to the advertising messages to be found in this issue of Roads and Streets on the pages as indicated above, condensed catalogs of those marked * as well as other specifications and construction data will be found in the Road and Street Catalog and Data Book, the 384 page annual reference guide for the highway industries, published by the Gillette Publishing Co.



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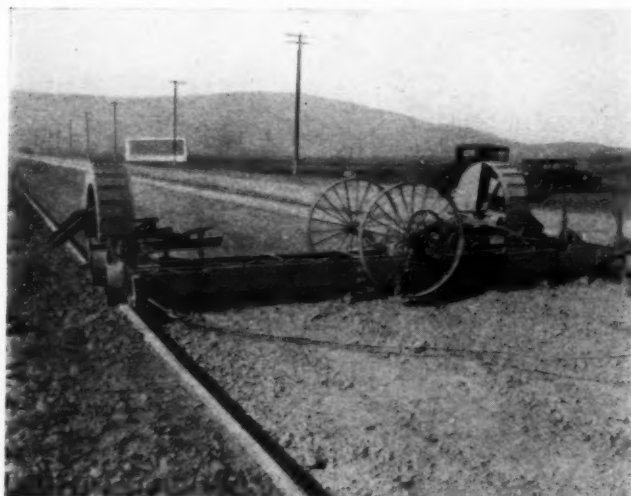
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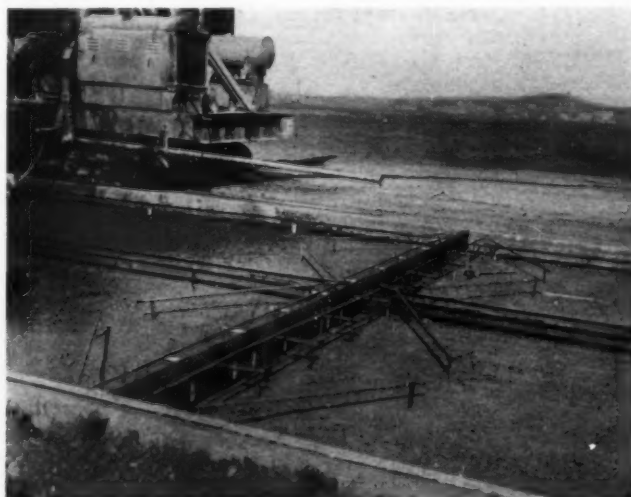


Left—Subgrader with Tailing Elevators. Right—Subgrade Completed; Workman Setting Wood Strip for Center Weakened-Plane Joint

Building a 40-Ft. California Pavement

WITH two 1-yd. pavers working together on the same strip of concrete pavement, a record for production with standard equipment was made by the Basich Bros. Construction Co., of Los Angeles, Calif., on the stretch of California's new Bayshore Highway between South San Francisco and Burlingame. After the paving crews were well organized a production of well over 800 cu. yd. per 8-hour day was maintained. A maximum run of 908 cu. yd. was made on Oct. 3 on the second 20-ft. strip of the 40-ft. concrete pavement. Such production, of course, required the best possible coordination of all operations from the batching of materials to the finishing of the pavement.

The Bayshore Highway is a new route south from San Francisco built to relieve the heavy traffic on the El Camino Real or Peninsula Highway, which, up to the present time, has carried the burden of travel in this important area. This latter route runs through developed territory and, consequently, traffic congestion occurs at many points. The Bayshore Highway on the other hand, taps new sections and, with direct alignment and a 199-ft. width of right-of-way, is expected to serve traffic needs for some time to come. It was graded and given a temporary surfacing during 1928 and 1929, but increases in traffic as the route became popular made early paving necessary. Contract for

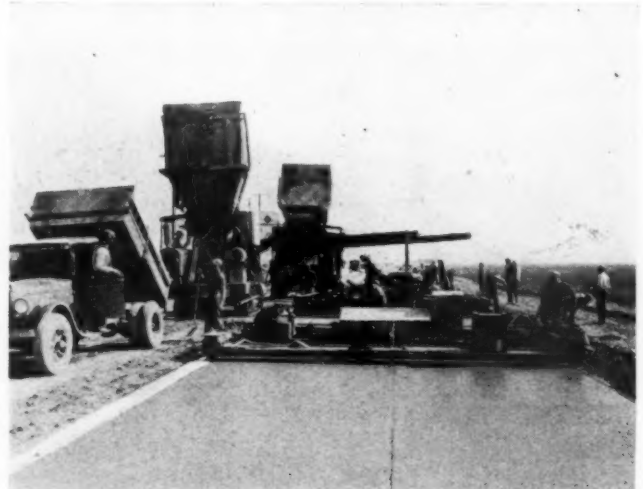


Left—Detail of Reinforcement and Dowels at Expansion Joint. Right—Two Mixers Close Together; Steel Placed; Workman in Foreground Is Oiling 1-In. Bars. This Design Results from Marshy Condition of Land

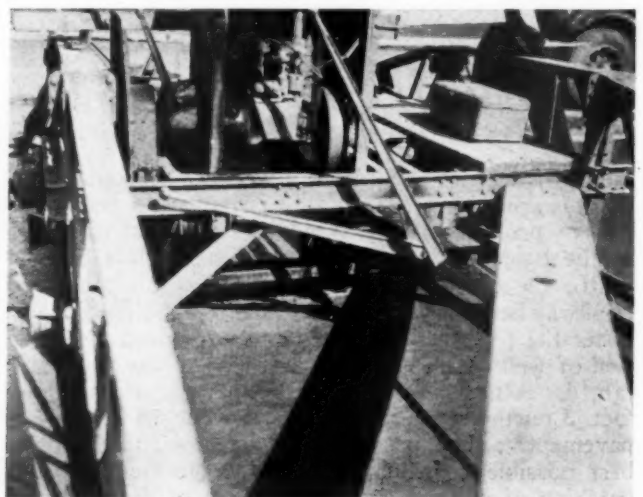
cement concrete pavement over 5.2 miles on the San Francisco end was awarded in July, 1930.

Pavement Details.—A heavy duty slab, 9 in. thick with edges increasing to 11 in. was selected for this highway. Two 20-ft. slabs are placed side by side,

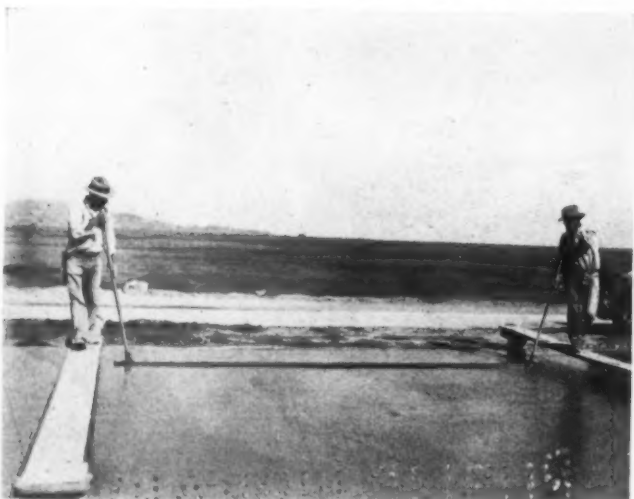
making a 40-ft. width of pavement. Each 20-ft. strip is divided at the center with a longitudinal weakened-plane joint, making the road serve as four 10-ft. lanes for travel. Ten-foot oiled shoulders, 4 in. thick, of crusher-run base and screenings top, flank the paved



Left—Casting Three Concrete Beams for Test of Modulus of Rupture. Right—Two Mixers and Two Finishing Machines



Left—Stripped Finishing Machine Used to Groove Concrete above Wood Strip. Right—Close-Up from Side of Grooving Machine. Note Shoe to Keep Concrete from Picking Up



Left—Finishing with Longitudinal Float. Right—Long-Handled Edger Used at Expansion Joints



Left—Burlap Covering Is Followed by Dirt-and-Water Curing. Right—Final Finishing and Straight-Edging for Surface Evenness Is Held Back Until Surface Water Has Disappeared

surface. In addition to the division of the 20-ft. concrete slabs by center weakened-plane joints, expansion joints of rubber material, $\frac{1}{2}$ in. thick, are spaced at 30-ft. intervals. Each 10 x 30-ft. panel thus formed by the joints is reinforced. One-inch round bars having a red-lead paint coat are used along each edge and along each side of the weakened-plane joint. These bars are oiled before concrete is placed and act as slip bars within the panel only. At each expansion joint, in addition to 24-in. dowel bars which have galvanized tin caps on one end and which are five in number for each 10-ft. width, two $\frac{5}{8}$ -in. bars are placed along the margin of the expansion joint, the top bar returning at a 45-deg. angle, 50 ft. back into the slab. All reinforcing bars are supported on metal chairs which are driven into the subgrade.

Preparing the Subgrade.—Subgrade preparation consisted of scarifying the existing surfacing to the depth of the oiling and placing imported borrow for new subgrade. This imported borrow totaled some 85,000 cu. yd. of material. One side of the roadway was prepared at a time. After headers had been set for the 20-ft. strip, the grade was finally shaped with a subgrader with cutters set to cut the depressed center for thickened pavement at the weakened-plane joint. To this subgrader were attached special tailing elevator wheels which removed the excess material and deposited it outside the header boards. The subgrade was then given its final rolling, and $\frac{1}{2}$ x 6-in. pointed board for the weakened-plane joint was set vertically and reinforcing placed.

Central Proportioning Used.—An important item in making the large production of concrete possible was the central proportioning plant used. This plant at South San Francisco, which gave the job an average truck haul for materials of $3\frac{1}{2}$ miles, was equipped with weighing batchers for each of the two sizes of coarse and fine aggregate, each hopper having a capacity of 15 cu. ft. Sand and rock were delivered by rail to this plant and dumped into bins from which they were elevated by belt conveyor to the batching plant. Cement was unloaded from cars in the same manner and elevated to a platform above the batchers from which the sacks were dumped on the load with the aggregates for one batch. California state highway specifications require a mix having 6 sacks of cement per cu. yd. of concrete. Each truck was partitioned for three batches.

Two Pavers Operated.—On the first 20-ft. strip of

pavement placed, the two pavers were placed one on each side of the strip, but on the second half the completed first half was used for roadway and the pavers traveled on this section also. They were placed as close together as possible so that there would be no interference between booms, and with the skip ends away from each other. Each mixer was equipped with a spiral gear on the skip hoist which speeded up this operation to raise the skip in about 8 seconds.

Finishing Operations.—Concrete, after being deposited on the subgrade, was struck off with a finisher followed by another finisher. The second machine had a wheel cutter which grooved the pavement slightly at the center-line above the wood strip which formed the lower part of the weakened-plane joint. Another cutter, built in the frame of a finishing machine, followed to groove the surface to a depth of 2 in. As the cut was made, ordinary $\frac{5}{8}$ -in. reinforcing bars, 10 ft. long, were laid in the groove to hold coarse material away until the joint was edged and finished. Final finishing operations followed in the usual manner with special attention paid to surface evenness. To get the best results, practically all floating was done with long floats which were moved from one edge of the pavement to the other.

A time limit of 125 days, excluding Sundays and holidays, was set for this job, this being one of the shortest ever specified for a job of this size in California. Estimates placed completion from 45 to 50 days ahead of time, or about Nov. 10. All concrete was in place about Oct. 22.

Curing is done with burlap, followed by earth covering wet down for 8 days and uncovered in 14 days.

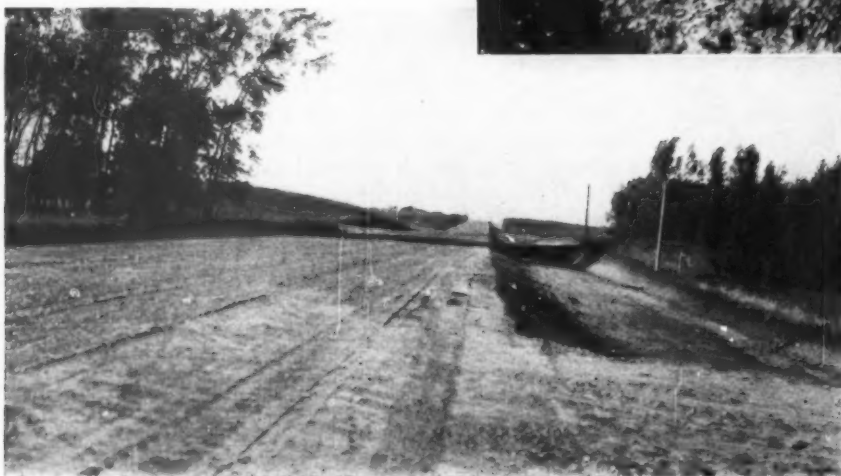
The Bayshore Highway pavement was built under the supervision of J. H. Skeggs, district engineer, California. Division of Highways. C. H. Purcell is state highway engineer. W. A. Rice was resident engineer and Paul Wilcox is superintendent for the Basich Bros. Construction Co, Contractors.

STATISTICS ON MIXERS.—From a study of paving jobs in Illinois it was found that mixers laying pavement on state highways during the past eight years have had an average per-season mileage varying from 2.70 to 6.97 miles for individual years. In 1928, 45 per cent of the mixers were 6-bag. Equipment charges on representative paving jobs included 10.1 ct. per sq. yd. for repairs and 5.5 ct. for fuel.

Views of MINNESOTA Highways and Bridges



Above and Right—Trunk Highway 9 near Lanesboro; 30-Ft. Roadway of Bituminous-Treated Gravel



Left — 40-Ft. Earth Subgrade, on Trunk Highway 15, near Fairmont

Pictures from O. L. KIPP
Construction Engineer, Minnesota
Department of Highways



Construction Work and Completed Section on Trunk Highway 3, near Lake City; 40-Ft. Subgrade, New Location

Right — 20-Ft. Concrete Pavement, Trunk Highway 5, near Mankato

Below — 20-Ft. Concrete Pavement, Trunk Highway 12, near Chaska, Showing Concrete Curb and Spillway



"What can I see at the Road Show?" — The answer to this question may be found in the Road Show Equipment Review to be found elsewhere in this issue of Roads and Streets

Right—Mississippi River Bridge at Anoka, on Trunk Highway 3; Length, 1,000 Ft.; Roadway 40 Ft. Wide; Two 8-Ft. Sidewalks



Above—Typical Rail Design on Short-Span Minnesota Bridges

Right—Steel Truss Bridge over Root River, on Trunk Highway 9, near Rushford; Length, Four 160-Ft. Spans; 24-Ft. Roadway





Oiled Road near Cache Creek Bridge, South of Apache, Okla.

Oiled Gravel Roads in Oklahoma

By RAY LINDSEY

Maintenance Engineer, Oklahoma State Highway Commission

THE Oklahoma Highway Department has applied oil to more than 800 miles of gravel roads during the past year, and judging from reports from the traveling public and from the requests from nearly all committees for such treatment of gravel roads, oiled gravel roads are both successful and popular. Two general methods are used, (a) the mulch method and (b) the mat method. These two methods will be discussed in the order named.

The Mulch Method.—The mulch method is used when it is desired to maintain the maximum of surface at the minimum of expense. The oil used in this method is either a mixed-base road oil or an oil blended from the residuum of a cracking plant, with an Engler viscosity at 122 deg. F. between 15 and 45, and a residue of 60 to 70 per cent. In Oklahoma this oil can often be hauled to the work from a local refinery.

It is necessary to have a minimum of about 200 cu. yd. of loose gravel on the road and this material should all pass a $\frac{3}{4}$ -in. round screen with about 50 per cent passing a $\frac{1}{4}$ -in. round screen. Satisfactory results have been secured with 30 to 80 per cent of this material passing a $\frac{1}{4}$ -in. round screen.

Equipment and Methods.—The necessary equipment for the mulch treatment consists of from one to three oil distributors and two to five power patrols or graders. The procedure is for one power patrol to precede the distributor, blading all surplus material to a windrow along the shoulder. The distributor follows, shooting the bladed surface with from 0.5 to 0.7 gal. of oil per sq. yd. applied at a temperature of from 140 to 180 deg. F. The amount of oil is determined by the amount of cover material available and the amount that penetrates into the road. Enough oil should be used to get maxi-

mum penetration and saturate all of the finer materials. Following the distributors are two power patrols or graders that pull the loose gravel from the windrow over the fresh oil, "blotting" it, so the oil will not pick up under traffic. One or more power patrols, or graders, are required to blade and reshape the previous day's run. Only one side at a time is treated. If the traffic is light, or if the road can be closed, more penetration and better results can be secured by applying the required amount of oil in two applications.

The first application, or primer, consisting of approximately one-half of the total amount used, is allowed to penetrate the gravel for 24 hours. Following this the second application is applied and blotted the same as when the single application is used. After both sides of the traveled roadway are oiled, the shoulders are oiled, using about one-half the amount used on the roadway. Two distributors and four blades will oil from 2.5 to 3 miles per day.

When the surface mats or cakes and begins to blister or peel down to the penetration, it can be bladed out and back again, and be maintained by blading the fine oiled gravel mulch across the road. This surface is practically dustless, does not corrugate under heavy traffic and does not require as much blading as gravel not oiled. The penetration keeps the original surface intact and prevents ravelling. It also prevents the accumulation of surplus gravel in dry weather. The oiled surface sheds water and prevents the road from becoming slushy and therefore dangerous in wet weather. One application in the spring, and another application of 0.3 gal. per sq. yd. in July or August, will provide a dustless and satisfactory surface on gravel roads when traffic is not over 1,500 vehicles per day.

*Preparing Road for Oiling*

**Stages in Oiling of U. S.
Highway 277 near Blanch-
ard, Okla.**

*Applying Road Oil**Blading Cover Material on Oil**Above — Second Operation Spreading
Cover Material**Left — Completing Spread of Cover
Material*

Costs.—This oil usually costs approximately 4 ct. per gal. applied. This makes the first treatment cost approximately \$350 per mile, and the second treatment less than \$200 per mile for the oil applied on the road. To the cost of the oil must be added the cost of blading and any additional gravel required for the "blotter." In addition to the dustless improved surface, the saving in replacement gravel will go a long way toward paying the total cost of oiling.

Mulch Method on Dirt Roads.—The mulch method can be successfully used on dirt roads. In treating dirt roads the primer application is made direct to the earth surface, and allowed to penetrate from 12 to 24 hours.

The second application is then made and "blotted" by using gravel previously windrowed along these shoulders. The primer application waterproofs the subgrade and the gravel surface provides an economical and satisfactory method of taking care of traffic on a new grade, until funds are available for more substantial treatment.

The Mat Method.—In the mat method, we use an asphalt-base oil with an Engler viscosity at 122 deg. F. of not over 45 for the first application and not over 100 for the second application, an asphaltic residue of 60 to 70 per cent for the first application and not over 80 per cent for the second and with a ductility of not less than 50 cm. at 77 deg. F. However, if the first



Oiled Road East of Anadarko on U. S. Highway 62

application is on clay or gumbo, we get better penetration by using an oil with an Engler viscosity of not over 30 at 122 deg. F. and without ductility. Considerable care should be exercised in selecting an oil for this treatment, in order that it will make a live, asphaltic mat that heals easily, can be bladed and reshaped in hot weather and does not become dry or brittle. The results to be expected from a certain oil cannot be determined from the tests, as oils showing the same standard tests may give entirely different results.

The Surface Material.—In this method more attention should be given to the grading, amount and uniform distribution of the cover material. A good grading is 100 per cent passing a $\frac{3}{4}$ -in. round screen, 60 per cent passing a $\frac{1}{4}$ -in., 40 per cent passing a No. 10 and 10 per cent passing a No. 80, with not more than 3 per cent passing the No. 200. However, material with a rather wide range of grading may be successfully used, if it does not have an excessive amount of any one size. An excess of coarse material makes the mat crumble and ravel easily and hard to reshape. An excess of material between the No. 20 and No. 80 screens may make the mat too soft, with a tendency to push or corrugate. An excess of material passing the No. 200 screen, especially if it is clay or silt, will tend to deaden the oil and make surface dry, brittle and impossible to maintain as a mat. Fine sand or stone dust is beneficial to the mat, but on account of the danger of getting clay or silt, we believe the dust should not be allowed to exceed 3 per cent. The amount of cover material should be from 8 to 10 lb. per 0.1 gal. of oil, depending on the grading of the material.

Method of Application.—If the application is on an old gravel base, the surplus material is bladed to a windrow on the shoulder and a priming application of 0.3 to 0.5 gal. per sq. yd. is applied by a distributor at a temperature of about 180 deg. F. This is allowed to penetrate for 24 hours or more. The idea is to get the maximum amount of penetration possible with one application of oil. If the road can be closed to traffic much better results can be secured. However if this is impossible, one side can be treated at a time, providing the primer oil does not pick up under traffic and leave streaks of the surface bare. If this occurs the surface is very apt to fail over such bare streaks.

If the application is made to loam, clay or gumbo, the surface should be smooth, hard and uniform and the same precautions taken to prevent the oiled material

picking up under traffic. If the application is to a sandy surface, considerable more oil will have to be used, possibly 0.8 gal. per sq. yd. in two applications.

After the primer coat is dry, the seal coat is applied (at the rate of 0.4 to 0.5 gal. per sq. yd.), then the cover material is bladed in immediately behind the distributor.

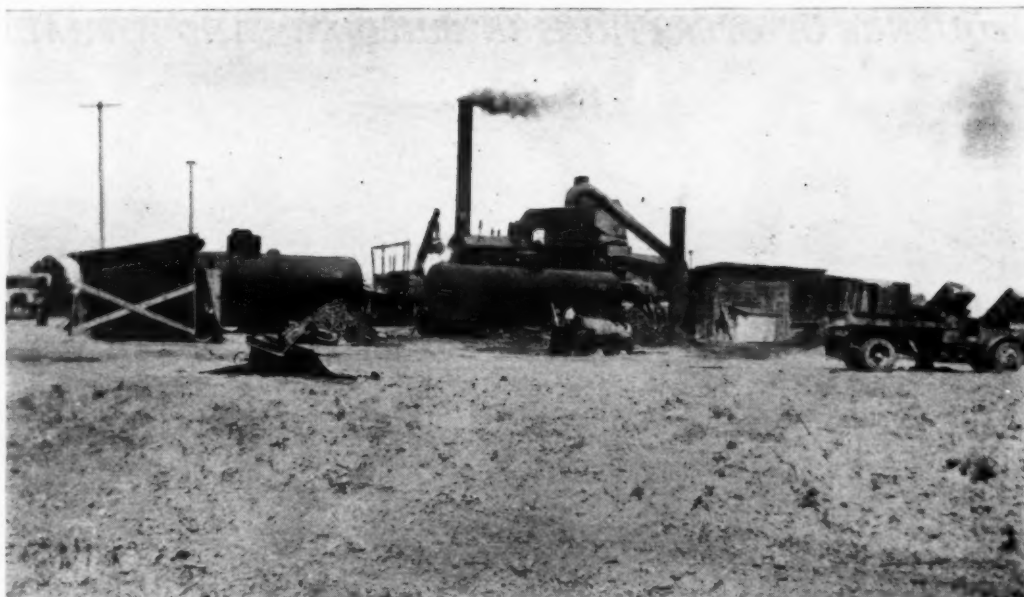
After both sides of the road are treated, the material is bladed to a windrow along the side, care being taken not to let the blades cut through the penetration. The material is then moved across the road and back again with blade graders until it has a uniform color and all of the aggregate material is well mixed with the oil, giving a crawly, fluffy appearance. This will generally require from three to six turns across the road. After the material is thoroughly mixed, it is laid down and smoothed up with a grader. This surface is then maintained with a grader for several days until a smooth, uniform mat surface is obtained.

During the construction, or immediately thereafter, stockpiles of mixed aggregate and oil are placed along the road for patching. This material may be mixed on the road and hauled to stockpiles or mixed in a small concrete mixer after the work is completed. After the mat has set, small breaks can be quickly repaired by the patrolmen using the premixed material. If a section of the road breaks or corrugates badly, due to an insufficient amount of oil, or to an excessive amount of oil, it can be bladed out, and additional oil or gravel added, remixed and laid down again.

The maintenance cost, including replacement gravel and oil, is about the same as for a plain gravel road.

The use of road oil has a permanent place in Oklahoma's highway program. It enables us to use a maximum amount of local material in providing an economical, dustless, all-weather surface on a large mileage of highways, until funds are available for a more permanent surfacing.

WASHINGTON INCREASES GAS TAX.—A farm-to-market road bill recently passed by the legislature of the state of Washington increases the gas tax from 2 ct. to 3 ct. The additional cent will provide an estimated \$2,197,000 the first two years, to be distributed among 39 counties as follows: One-half equally proportioned, one-quarter in ratio of vehicle registration and one-quarter in ratio of number of farms.



General View of Plant and Asphalt Tank Cars

SAND ASPHALT

A Pavement Type Constructed of Local Aggregates

By C. N. CONNER

Associate Editor

WHEN climate and soil are favorable and local sand is available, sand asphalt has proved to be an economical type of surfacing. It is a hot plant mix of sand, filler and bitumen; in some cases, notably in Massachusetts, stone screenings are added.

The construction methods are almost identical with those used for other hot mixes. Because local sand comprises at least 90 per cent of the mixture its cost is much lower than for surfaces whose aggregates must be shipped relatively long distances. Sand is also a good subgrade and sand asphalt gives best service on soils which contain a large amount of sand. It has also been successfully used as a surfacing course on stone and marl bases.

The roads selected for surfacing with sand asphalt have commonly been in the Atlantic coastal plain. They have sand for a subgrade and local sand suitable for the bituminous mixture is found adjacent to or within a short-haul distance of the roads, themselves. The state of Massachusetts first used sand asphalt in the sand hills of Cape Cod and an excellent example of this type with some modifications was laid as recently as 1930. In North Carolina the type was introduced by Charles Upham in 1922 and an appreciable mileage is still being laid annually in that state. Florida has included sand asphalt in its

specifications and has laid a relatively small mileage, as has also Delaware, where several projects have been constructed. With a few minor changes sand asphalt as laid in North Carolina is now acceptable for federal aid.

Specifications for Materials.—The sand commonly used roughly approximates that used in standard sheet asphalt but the limits for size and proportions are much more liberal. The filler is that used in sheet asphalt and asphaltic mixtures of the fine-aggregates types. The bitumen is a standard asphaltic cement and is commonly of a lower penetration than that used in standard mixtures. A comparison of the sands acceptable in North Carolina specifications for sand asphalt and for sheet asphalt explains this point (see Table I).

The specifications of Florida and Delaware are quite similar to those of North Carolina.

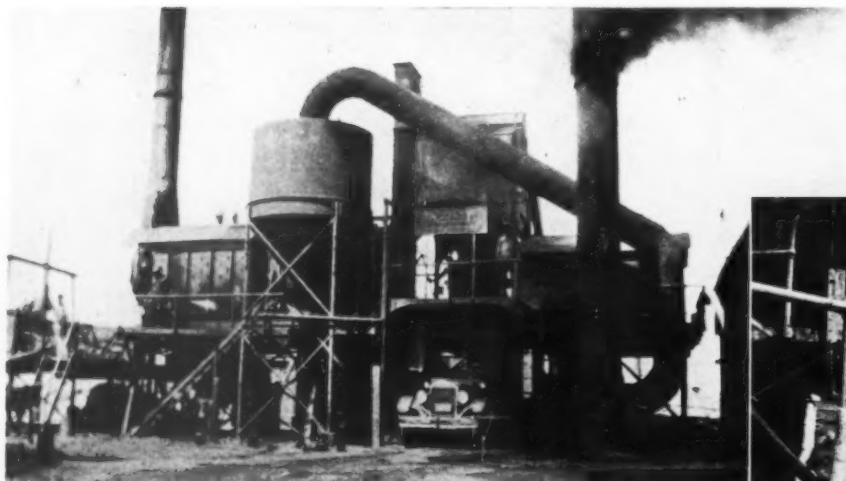
Sands used in Massachusetts are somewhat coarser and stone screenings are added to the mixture in that state. Massachusetts also adds a seal coat to the surface to close the surface voids. Departures from the specified gradations have been permitted in North Carolina after laboratory tests have shown that such departures can be safely made.

Experiences with plant mixes and mixed-in-place types generally have shown that fairly open specifications

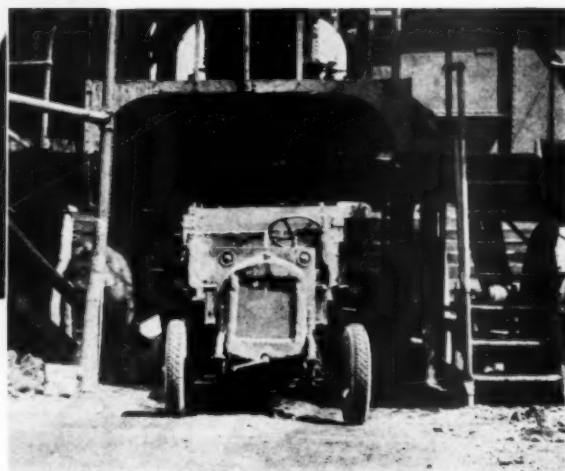


Stockpile of Local Sand and Sand Conveyor

SEQUENCE OF OPERATIONS IN BUILDING SAND ASPHALT ROADS



Above—Close-Up of Plant. Right—Under the Pug Mill, Ready for a Load



Left—The Sandy Subgrade. Right—Dumping Hot Mixture on Dump Boards



Above—Spreading and Shaping with Modern Finishing Machine

Below—Rolling Base Course



ILLUSTRATED, FROM PLANT TO FINISHED SURFACE OF HIGHWAY



Above—Squeegee Pot for Spreading
Flush Coat

Left—Section Showing Flush or
Squeegee Coat

Right — Top Course before Final
Rolling



Left—Section Just After Being Dusted with Cement. Right—The Finished Road



Surface Treatment with Bitumen and Chips for Sealing Cracks or Open Surface

may be used provided tests show that fact and that mixtures so prepared are giving satisfactory service.

A seal coat has been used successfully in North Carolina and Massachusetts after the pavement has been in service for six months or a year to improve sand asphalt surfaces which appeared "lean" or cracked.

Construction Methods.—After the supply sources of aggregates are approved the mixtures are prepared in standard plants and hauled to the subgrade. At the road the hot mixtures are dumped on dumping boards or spread through aggregate spreaders. Finishing is accomplished by hand raking or by a mechanical finishing machine followed by compaction with power rollers.

The surface is commonly placed in two layers which are bonded together by a "squeegee" coat of hot asphaltic cement. The early work in Massachusetts was in one layer and some experimenting in one-layer construction has been done in North Carolina. Where placed in two layers the bottom course contains less bitumen than the top course and the commercial filler or "dust" passing the 200-mesh sieve is omitted.

Maintenance Methods.—Little maintenance is required when this type is well constructed on sand or sand-clay subgrades, and where adequate drainage has been provided by ditching or by raising embankments above low and undrainable land.

Costs and Service.—For a surface $4\frac{1}{2}$ to 5 in. in thickness the cost in North Carolina for projects laid by the state during 1922 and 1923 averaged about \$1.50 per sq. yd. Contract prices for the same period and up to 1926 were about the same. Since those dates contract prices have generally dropped for all types and sand asphalt is now laid for as low as \$1.20.

Maintenance costs have always been low because of favorable subgrade conditions and because traffic has seldom averaged more than 1000 vehicles per day.

Sand asphalt in Massachusetts has recently been built to three-lane width and has carried large volumes of local and tourist traffic.

Sections as narrow as 9 and 10 ft. have been laid as development roads. Several of these have recently been resurfaced and widened to accommodate the resulting increase in traffic.

This type is worthy of investigation for prospective

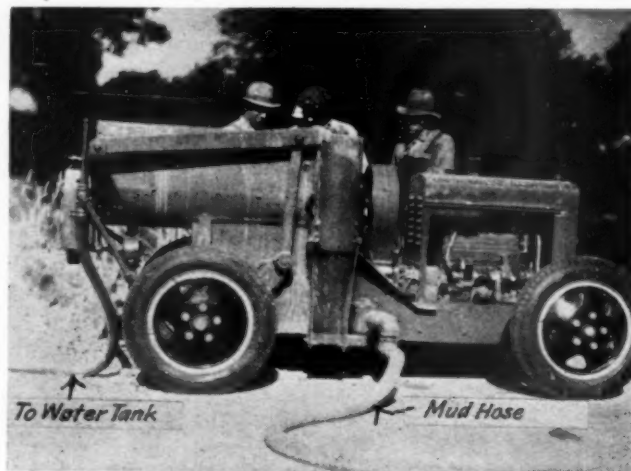
TABLE I—SHEET AND SAND-ASPHALT SANDS ACCEPTABLE IN NORTH CAROLINA

Sheet Asphalt Surface Course		
Passing	Retained On	Per Cent
10-mesh	.....	95-100
10-mesh	40-mesh	14-30
40-mesh	80-mesh	35-60
80-mesh	200-mesh	20-40
200-mesh	.....	0-5
Sand Asphalt Surface Course		
Passing	Retained On	Per Cent
10-mesh	.....	98 to 100
10-mesh	20-mesh	3 to 15
20-mesh	30-mesh	4 to 15
30-mesh	40-mesh	5 to 25
40-mesh	50-mesh	5 to 30
50-mesh	80-mesh	5 to 40
80-mesh	100-mesh	6 to 20
100-mesh	200-mesh	10 to 25
200-mesh	.....	0 to 5
Sand Asphalt Base Course		
Passing	Retained On	Per Cent
10-mesh	.....	95 to 100
10-mesh	40-mesh	14 to 50
40-mesh	80-mesh	30 to 60
80-mesh	200-mesh	16 to 40
200-mesh	.....	0 to 6

construction in sections where sandy subgrades exist and where local sand is available at or near the project, and where coarser aggregates must be shipped relatively long distances at an appreciable increase for hauling charges.

A Machine for Lifting Sunken Pavement Slabs

Many a good section of concrete road has been broken up and re-poured because the ground under the slab washed out and let the road drop. The accompanying illustration shows an outfit developed by Prof. John Poulter, of Iowa Wesleyan College, Mt. Pleasant, Iowa, for repairing such sections of pavement without wrecking and relaying the concrete, by lifting the sunken slabs to the proper elevation. This method had proved practical on many jobs in southeastern Iowa.



Machine for Lifting Sunken Road Slabs, Latest Model

Several holes, about $2\frac{1}{2}$ in. in diameter, are first cut in the slab, the number and placing of the holes depending upon the condition of the slab. As a rule, three holes are required for 10 ft. of slab, although under some conditions two holes are sufficient. A mixture of soil and cement is pumped through these holes. One part of cement to 25 parts of soil has been found satisfactory. This mix hardens in three or four hours, until it is as firm as the other material in the subgrade. The pressure required to lift the slab, usually about $\frac{5}{8}$ lb. per sq. in., is less than that required to push the mud embankment out at the side; consequently, the fill remains undisturbed and the slab rises.

This scheme has proved so useful that some of the contractors in southeastern Iowa prevailed on Professor Poulter to develop a special machine for the purpose. The latest and best machine is able to pump from 25 to 30 cu. yd. of mix a day.

SIDEWALKS ALONG HIGHWAYS.—An act passed this year by the New Jersey legislature provides that the state highway commission may build sidewalks along state highways. Two other states, Delaware and West Virginia, have made such provisions, according to a recently conducted survey to which 36 states replied. Only about a third of the states have provisions for permitting towns and counties to build country walkways even at their own expense.

State Highway Construction in 1930 and 1931

*Reports from State Highway Officials Showing
Mileage Completed and Expenditures Last Year and
Proposed Mileage and Probable Expenditures for 1931*

New England States

Maine

State highway completed in 1930 included 26 miles of concrete pavement, 12 miles of bituminous macadam and 54 miles of gravel road. Details of the work are given in the table.

Maine State Highway Completed in 1930				
	Approximate miles	Width Sur- faced Ft.	Average Thickness In.	Estimated Aver. Cost Per Mile
Concrete	26	20	9-7-9	\$50,000
Bituminous Macadam	12	20	8	39,000
Gravel	54	18	12 to 18	22,000
Graded and drained	2	---	---	20,000

The uncompleted work carried over to 1931 included 10 miles of concrete pavement requiring a probable expenditure of \$350,000; 0.5 mile of bituminous macadam, \$17,000; and 3 miles of gravel road, \$60,000.

The tentative new construction program for 1931 is as follows:

Proposed New Construction for 1931		
	Miles	Probable Expenditures
Concrete	22	\$1,084,000
Bituminous Macadam	22	726,000
Gravel	84	1,862,000
Graded and drained	10	260,000

The average unit bidding prices in 1930 on the principal items were as follows:

Description	Unit	No. of Contracts	Average Unit Price
Clearing and grubbing	acres	16	\$102.50
Earth excavation	cu. yd.	33	0.78
Rock excavation	cu. yd.	30	2.97
Trees removed	each	24	8.16
Excavation for structures	cu. yd.	31	1.47
Stone fill	cu. yd.	6	1.40
Common borrow	cu. yd.	29	0.82
Gravel borrow	cu. yd.	5	1.16
Gravel sub-base	cu. yd.	11	1.11
Gravel base course	cu. yd.	27	1.19
Stone base course	cu. yd.	15	2.21
Crushed stone base course	cu. yd.	5	4.60
Gravel surface course	cu. yd.	17	1.30
Bituminous macadam surface course	cu. yd.	5	5.65
Bituminous material	gal.	5	0.07
Cement concrete pavement	cu. yd.	12	7.14
Bar reinforcement for pavement	lb.	12	0.012
Class "A" concrete	cu. yd.	21	21.76
Class "B" concrete	cu. yd.	28	20.42
Steel reinforcement for concrete structures	lb.	25	0.06
Laying 12-in. corr. metal pipe	lin. ft.	29	0.34
Laying 15-in. corr. metal pipe	lin. ft.	25	0.37
Laying 18-in. corr. metal pipe	lin. ft.	19	0.40
Laying 21-in. corr. metal pipe	lin. ft.	3	0.23
Laying 24-in. corr. metal pipe	lin. ft.	18	0.50
Laying 30-in. corr. metal pipe	lin. ft.	5	0.60
Laying 36-in. corr. metal pipe	lin. ft.	8	0.68
Laying 15-in. cast iron pipe	lin. ft.	3	0.66
Laying 18-in. cast iron pipe	lin. ft.	3	0.81
Laying 24-in. cast iron pipe	lin. ft.	4	1.05
Laying 36-in. cast iron pipe	lin. ft.	1	0.90
Laying 12-in. concrete pipe	lin. ft.	1	0.40
Laying 15-in. concrete pipe	lin. ft.	8	0.89
Laying 18-in. concrete pipe	lin. ft.	12	1.05
Laying 24-in. concrete pipe	lin. ft.	14	1.38
Laying 30-in. concrete pipe	lin. ft.	4	1.75
Laying 36-in. concrete pipe	lin. ft.	2	2.00
Drop inlets	each	8	52.50
Catch basins	each	4	81.25
Plain riprap	cu. yd.	1	2.00
Hand-laid riprap	cu. yd.	1	2.50
Tile underdrain	lin. ft.	8	0.93
Cobble stone gutter	sq. yd.	11	1.33
Wire cable guard rail	lin. ft.	33	0.60
Anchorage for wire cable guard rail	each	33	13.72
Bituminous treatment	gal.	16	0.19

L. D. Barrows, Augusta, Me., is chief engineer, state highway commission.

Massachusetts

Approximately 127 miles of state highway were constructed and reconstructed in fiscal year 1930. In addition the state supervised the construction and reconstruction of 395 miles of highway. The total expenditure was \$25,000,000. The estimates for 1931 are about the same as for the previous year.

A. W. Dean, Boston, Mass., is chief highway engineer.

New Hampshire

State highway completed in 1930 included 58 miles of 20-ft. concrete pavement, 7 miles of bituminous macadam and 165 miles of gravel road. Details of this work are given in the accompanying tabulation.

New Hampshire State Highway Completed in 1930				
	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	58	20	9-6-9	\$22,000*
Bituminous macadam	7	20	3	12,000*
Macadam	25	20	6	9,000*
Gravel	165	23	5	3,200*
Graded and drained	3.5	25	---	---

*Grading and drainage hard surface roads, \$25,000.
Grading and drainage gravel roads, \$15,000.

In addition 3.5 miles of uncompleted concrete pavement were carried over to 1931 requiring a probable expenditure of \$77,000.

The new construction for 1931 will be approximately the same as in 1930.

F. E. Everett, Concord, N. H., is state highway commissioner.

Vermont

State highway completed in 1931 included 65 miles of concrete, 2 miles of bituminous macadam and 3 miles of oil mixed surface. Details follow:

Vermont State Highway Completed in 1930				
	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	65	18	7	\$48,000
Bituminous Macadam	2	18	6	44,000
Oil mixed	3	18	6	4,000
Graded and drained	16	18	---	12,000
Resurfaced, drained or surface treated	70	18	---	3,500

All the 1930 program was completed, no work being carried over to 1931.

Information on the program for 1931 is not available at this time. The legislature which convenes in January will appropriate money for the next two years.

Hubert E. Sargent, Montpelier, Vt., is state highway commissioner.

Rhode Island

During the past year 15 miles of 20 to 40 ft. concrete pavement and 4.8 miles of 36 to 40 ft. sheet asphalt pavement were completed under the direction of the State Board of Public Roads. The accompanying tabulation gives some details of the 1930 work.

Rhode Island State Highway Completed in 1930				
	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	15.15	20-40	8	\$55,000
Sheet asphalt	4.80	36-40	---	80,000
Bituminous macadam	27.25	20	---	40,000
Macadam surface treated	4.30	20	8	30,000
Gravel surface treated	1.20	20	8	15,000

*2-in. top on 6-in. base.

The uncompleted work carried over to 1931 included 7.15 miles of concrete and 20.28 miles of bituminous macadam, requiring a total expenditure of \$1,350,000 to complete the present contract.

The state highway program for 1931 for construction calls for an estimated expenditure of \$4,300,000.

G. H. Henderson, Providence, R. I., is chief engineer, State Board of Public Roads.

Middle Atlantic States

New Jersey

Contracts let by the State Highway Commission up to Dec. 9, 1930, included the following:

	Miles
Concrete	70.618
Granite block on concrete	0.163
Sheet asphalt on concrete	1.969
Bituminous concrete	2.330
Gravel	0.002
Concrete widening	9.841
Gravel widening	1.593
	86.516
Piers and foundations (no pavement)	0.956
Total	87.472

It is estimated that 150 miles of road will be constructed in 1931 with a probable expenditure of \$37,000,000.

Jacob L. Bauer, Trenton, N. J., is state highway engineer.

New York

A total of 725 miles of state highway was completed in 1930. The expenditure was about \$56,000,000. A similar program is expected in 1931.

A. W. Brandt, Albany, N. Y., is commissioner of highways.

Pennsylvania

A total of 1,287 miles of pavement was completed in 1930, the estimated expenditure being \$65,000,000. The 1931 program has not been decided upon.

Samuel Eckels, Harrisburg, Pa., is chief engineer, state highway department.

East North Central States

Ohio

State highway contracts totaling \$25,371,121 were let in 1930 by the Ohio Department of Highways. These contracts were as follows:

	Miles	Contract Price
Paving*	431	\$16,129,273
Traffic bound macadam, including drainage structure	67	1,025,601
Grading and constructing drainage structures	36	733,987
Surface treating	1,068	1,556,677
Guard rail	121	333,209
Concrete widening and resurfacing	25	482,014
Brick widening and resurfacing	19	768,285
Bituminous concrete	6	63,977
Miscellaneous contracts .....	.....	270,757
109 bridge contracts .....	.....	4,007,338

The program for next year has not been decided upon. There will be change of government on Jan. 15, 1931, and it is not possible to forecast the construction program.

R. N. Waid, Columbus, O., is director, department of highways.

Illinois

During 1930 this state completed 785.5 miles of paving, 152.55 miles of grading and 116 miles of bridges on the state bond issue system. The counties under state supervision completed 218.89 miles of paving, 28 miles of grading and 44 bridges on the state aid system. The estimated expenditure for highway purposes during 1930 was \$7,940,000 for principal and interest on bonds,

\$3,455,000 for maintenance of state highways, \$713,000 for policing and \$30,900,000 for construction.

The program for 1931 will involve this construction of 1,500 miles of new work at an approximate cost of \$47,000,000. The other expenditures will be \$4,500,000 for maintenance, \$1,000,000 for policing and \$8,000,000 for principal and interest on bonds. The counties will build under state supervision between 400 and 500 miles of new work.

Frank T. Sheets, Springfield, Ill., is chief highway engineer.

Indiana

State highway work completed to Sept. 30, 1930, included 398 miles of concrete, 48 miles of rock asphalt and 102 miles of bituminous retread. Details of the 1930 work are given in the accompanying tabulation.

Indiana State Highway Work

	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	398	*	9-7-9	\$25,061
Rock asph.	48		↓	23,000
Bituminous retread	102	20	3½	10,000
Light road oil	393	20	1	2,000
Macadam	30	18	5	8,000
Gravel	18	18	6	7,000
Graded and drained	30			

* 383.69 miles 18-ft. pavement—10.354 miles 40-ft.—2.320 miles 30-ft. and 0.297 mile 35-ft. pavement.

† ¾ in. rock asphalt on 8 in. base.

The uncompleted work carried over to 1931 included 9 miles of concrete pavement requiring a probable expenditure of \$225,000, and 3 miles of graded and drained roads.

The construction program for 1931 has not been completed. The probable expenditures will be \$18,600,000.

John J. Brown, Indianapolis, Ind., is director state highway commission.

Michigan

A total of 702 miles of various type surfaces were laid in 1930 at an estimated expenditure of \$25,000,000.

The probable construction expenditure in 1931, including emergency federal aid apportionment is \$25,500,000.

Grover C. Dillman, Lansing, Mich., is state highway commissioner.

Wisconsin

Contracts for 1930 approved up to Dec. 1 by the state highway commission amounted to \$17,500,000, this including bridges and miscellaneous structures. The accompanying tabulation gives details of the this year's work.

Wisconsin State Highway Completed in 1930

	Miles	Average Width Ft.	Thickness In.	Estimated Aver. Cost Per Mile (Contract)
New concrete	380.66	20	9-6½-9	\$26,100
Concrete reconstruction	6.67	35	10-8-10	62,500
Concrete widening	12.04			22,200
Gravel	236.76	26	2 to 6	4,800
Crushed stone	81.49	26	2 to 6	2,830
Graded and drained	177.35	30		5,950
Bituminous surface (all types)	47.34	20		10,530
Surface treatment	60.00	24		850

The uncompleted work carried over to 1931 was as follows:

Uncompleted Work Carried Over to 1931

	Miles	Probable Expenditures
Concrete	21.55	\$581,000
Gravel	15.00	75,000
Crushed stone	16.00	48,000
Grade and drain	0.00	
Bituminous surface	24.00	200,000

The principal item in the work proposed for 1930 is

the construction of 302 miles of concrete pavement. The table shows the proposed work.

Proposed New Construction for 1931		
	Miles	Funds Available
Concrete	302	\$10,500,000
Gravel and stone	165	2,047,000
Shale and trailings	8	87,000
Grade and drain	70	1,060,000
Bituminous surface	60	714,000
Structures only		1,640,000
Miscellaneous projects		366,000
		\$16,114,300

The new construction noted above will undoubtedly be increased when the results of county board actions are available.

Some of the average unit bid prices on principal items on work which was let prior to Oct. 1, 1930, are as follows:

Item	Unit	Federal	State
Clearing	Acre	\$62.60	\$42.20
Grubbing	Acre	78.00	59.50
Earth excavation other than concrete	Cu. yd.	.34	.33
Borrow on roads other than concrete	Cu. yd.	.37	.43
Earth excavation on concrete roads	Cu. yd.	.37	.38
Borrow on concrete roads	Cu. yd.	.46	.50
Concrete Culverts	Cu. yd.	24.90	24.50
Double strand cable guard fence	Lin. ft.	.52	.49
Single strand cable guard fence	Lin. ft.	.39	.38
One course concrete pavement, exclusive of cement	Sq. yd.	1.12	1.11
1/4 in. expansion joints	Each	4.22	4.45
1 in. expansion joints	Each	4.75	5.40
Gravel complete in place	Cu. yd.	.82	1.02
Crushed stone, complete in place	Cu. yd.		1.92
Concrete, 6 to 20 ft. spans, exclusive of cement and reinforcement	Cu. yd.	17.40	17.10
Concrete over 20 ft. spans, exclusive of cement and reinforcement	Cu. yd.	16.65	16.65

W. C. Buetow, Madison, Wis., is state highway engineer.

West North Central States

Minnesota

During 1930 state highway completed comprised 280 miles of paving, 433 miles of bituminous treatment, 353 miles of gravelling, and 453 miles of grading. The average width of the pavement is 20 ft. and the subgrade 40 ft. The average cost per mile of paving is \$25,000; bituminous treatment, \$1,700; gravelling, \$2,400, and grading, \$12,800.

The program for 1931 at this time is based on an estimated mileage of 247 miles of paving, 300 miles of bituminous treatment, 350 miles of gravelling, and 311 miles of grading.

J. T. Ellison, St. Paul, Minn., is chief engineer, state highway department.

Iowa

The state highway work completed in 1930 included 1,030 miles concrete pavement, 247 miles gravel surfacing, and 423 miles graded and bridged road. The total construction expenditures was \$39,475,000.

The probable new state highway construction for 1931 includes 600 miles concrete pavement, 230 miles gravel surfacing, and 240 miles of graded and bridged road. The probable construction expenditure is \$20,000,000.

Fred R. White, Ames, Ia., is chief engineer, state highway commission.

North Dakota

State highway work completed in 1930 comprised 23 miles of 20 ft. oil-mix, 3 in. loose depth, at an average cost of \$3,450 per mile; 371 miles of gravel road at an average cost of \$1,400 per mile; 487 miles of graded and drained road at an average cost of \$3,400 per mile; the regarding of 25 miles of road at an average cost of \$3,400 per mile; and the regravelling of 147 miles of road at an average cost of \$600 per mile.

The uncompleted state highway work carried over to 1931 included 5 miles of oil mix, 230 miles of gravel, 410 miles of graded and drained road, 81 miles of re-grading and 26 miles of regravelling.

The proposed new construction for 1931, based on assumption of 100 per cent Federal Aid without time restriction is as follows:

	Miles
Oil mixed	125
Gravel road	800
Graded and drained road	450

H. C. Frahm, Bismarck, N. Dak., is chief engineer, state highway commission.

South Dakota

The state highway construction completed during 1930 included 30 miles of concrete pavement, 240 miles of gravel road and 200 miles of grading. The expenditure was \$6,200,000.

The 1931 program includes 40 miles of concrete road, 250 miles of gravel road and 300 miles of grading. The funds available amount to \$8,000,000.

J. Maughs Brown, Pierre, S. Dak., is state highway engineer.

Missouri

State highway work completed in 1930 included 365 miles earth road, 839 miles gravel road, 370 miles 20-ft. concrete road, 39 miles 18-ft. concrete road, 15 miles 10-ft. concrete road, 48 miles 9-ft. concrete road, and 7 miles of miscellaneous types. The total mileage of state highway completed was 1,692.

The estimated construction program for 1931 calls for 1,297 miles earth road, 924 miles of gravel road, 5 miles of oil surface, 21 miles of retread, 135 miles of 10-ft. concrete road, 192 miles of 20-ft. concrete road, and 11 miles of 40-ft. concrete road. The total proposed mileage is 2,585 and the cost is \$30,000,000.

T. H. Cutler, Jefferson City, Mo., is chief engineer, state highway commission.

Kansas

State highway completed in 1930 included 400 miles of earth road and 900 miles all weather roads. The total expenditure was \$9,180,000. The program for 1931 includes 400 miles of earth road and 800 miles of all weather road, the probable expenditure being \$8,000,000.

W. V. Buck, Topeka, Kan., is state highway engineer.

Nebraska

State highways completed in 1930 included 133 miles concrete paving, 567 miles gravel, 584 miles earth grading, 12 miles oil mixed sand. The total approximate expenditure was \$6,000,000. For 1931 is estimated that there will be about 225 miles paving and about same miles grading gravel and oil sand as in 1930 with about \$9,000,000 probable expenditure.

A. T. Lobdell, Lincoln, Neb., is chief, Bureau of Roads.

South Atlantic States

Delaware

State highway work completed in 1930 included 40.5 miles of concrete 13 miles traffic bound macadam and 17 miles of widening concrete pavement. Details of the work are given in the table.

Delaware State Highway Completed in 1930

	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	40.51	20-18-16-15-9 8, 8-6-8, 7-6-7	8	\$33,000*
Macadam traffic B.....	13.59	16	4	7,143
	4.6	20	6	6,150
Widening concrete.....	17.16	4	8	12,294
Widening with 2 conc. shoulders and resur- facing macadam.....	5.86			36,333

*Based on 18-ft. roadway.

The uncompleted work carried over to 1931 was 4.2 miles of concrete.

The proposed new construction for 1931 comprises 40 miles of concrete pavement, 15 miles traffic bound macadam and widening 16 miles of concrete pavement. The probable expenditure is \$1,800,000.

W. W. Mack, Dover, Del., is chief engineer state highway department.

Maryland

The state highway commission expended \$14,000,000 in 1930 for construction and maintenance. The new construction included 175 miles of concrete road, 50 miles of macadam and 56 miles of gravel road. The estimated program for 1931 is approximately the same as that for 1930.

H. D. Williar, Jr., Baltimore, Md., is chief engineer, state road commission.

Virginia

A total of 251.2 miles of state highway were completed in the period July 1, 1929 to June 30, 1930. In addition 664 miles of state highway were under construction on July 1 of last year and practically all of this work has now been completed. This makes the paved road mileage of the state over 3,200. The following table shows the work completed to June 30:

	Miles	Cost
Concrete	18.257	\$ 545,150
Sheet asphalt	7.729	346,253
Bituminous macadam	56.862	2,107,301
Surface treated macadam	17.890	480,174
Loose stone macadam		
Slag		
Gravel		
Top soil and sand-clay	131.574	1,441,682
Graded and drained (A).....	19.563	301,481
Total	251.875	\$5,222,043

The work under construction on July 1 last was as follows:

Types	Miles	Allocation	Paid to June, 30, 1930
Concrete	15.754	\$ 317,344	\$ 165,783
Asphalt	1.606	87,000	45,168
Bituminous macadam	80.537	2,625,770	1,971,584
Surface treated macadam.....	170.258	5,262,028	2,808,366
Surface treated gravel and soil.....	208.124	2,633,236	1,666,759
Grading and drainage.....	188.084	2,421,803	1,121,950
	664.363	\$13,347,183	\$7,779,613

In addition there were completed by state forces 277 gravel and soil" in the above table, their were surfaced with bituminous material in 1930 approximately 400 miles of roads that were conditioned by the maintenance forces or built since June 30 and surface treated, making a total of approximately 600 miles of gravel and soil roads surface treated with bituminous material last year, and bringing the total surface treated mileage up to about 1900.

The largest bridges completed or under construction last year were as follows: On U. S. 121, a 720-ft. steel and concrete structure at Jackson's Ferry across New River, eliminating a ferry crossing; another across New River at Glenlyn, 936 ft., which also eliminates a ferry crossing; at North River near Glasgow a 409-ft. steel and concrete bridge; over the Staunton River at Brook-

neal an 867-ft. steel and concrete structure, and over Staunton River near Clover another bridge of 959 ft. On U. S. Route 50 east of Winchester a steel and concrete bridge of 1,199 ft. was completed in June last year.

The appropriations for 1930 and 1931 are about the same, approximately \$10,000,000 each, which will mean that about as much work can be done in 1931 as during last year.

C. S. Mullen, Richmond, Va., is chief engineer, state highway department.

North Carolina

The state highway commission placed the following work under contract in 1930:

Graded roads	59.03 miles
Topsoil, sand clay.....	87.56 miles
Cravel	71.68 miles
Concrete	138.56 miles
Asphalt	81.94 miles
Bridges	8,081 feet

In addition there were completed by state forces 277 miles of surface treated topsoil or gravel, exclusive of the mileage of retreatment work.

The source of revenue at the present time is derived from a 5 ct. per gallon gas tax and a license and title fee. The counties receive 1 ct. of the gas tax for the maintenance of county road systems. From the remainder is paid the maintenance and betterment work, administration, debt service on bonds issued in the past, highway patrol, and the surplus is spent on construction.

It is not possible at this time to give detailed information concerning the 1931 program further than from present indications approximately \$5,000,000 will be available for new construction, and \$5,000,000 for maintenance and betterments.

The state legislature will meet in January, 1931, and it is impossible to surmise what action they will take regarding additional funds for highway improvements.

John D. Waldrop, Raleigh, N. C., is state highway engineer.

South Carolina

It is estimated that during the year 1930, approximately 450 miles of hard surfaced roads were constructed, of which 370 miles are of the standard concrete pavement type and 80 miles of the bituminous double surfacing type. The expenditure for construction during the year amounts to approximately \$12,600,000.

The 1931 construction program calls for an expenditure of \$20,000,000 on the state highway system. This amount of money will build approximately 550 miles of standard pavement, 260 miles of bituminous surfacing, 280 miles of earth types, and 24,000 ft. of bridges.

Chas. H. Moorefield, Columbia, S. C., is state highway engineer.

West Virginia

State highway completed in 1930 included 102 miles of concrete, 56 miles of bituminous macadam, 101 miles of macadam and 74 miles of gravel. Details of last year's work are given in the accompanying table.

West Virginia State Highway Completed in 1930

	Miles	Average Width sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	102.39	18	7	\$31,000
Bituminous concrete	5.76	18	11	25,000
Bituminous macadam	55.95	18	11	24,200
Macadam	101.06	18	8	12,000
Gravel	73.77	20	8	6,000
Graded and drained	105.29	30	..	17,000
Rock asphalt	7.44	18	10	27,000
Shale	18.13	20	8	2,000
Bituminous retread	101.88	20	2½	6,000

The uncompleted state highway work carried over to 1931 was as follows:

	Miles	Probable Expenditures
Concrete	39.18	\$ 800,000
Bituminous macadam	3.40	75,000
Macadam	5.00	50,000
Gravel	7.90	30,000
Graded and drained	142.00	1,500,000
Shale and grading	19.70	300,000

Construction will be pushed vigorously in 1931. The total sum available for new contracts is \$10,000,000 of road bond proceeds and \$1,324,680 of Federal Aid.

The average unit bidding prices were:

Unclassified excavation, 55 ct. per cubic yard; concrete paving, \$11.54 per cubic yard; stone base, \$4.41 per cubic yard.

H. J. Spelman, Charleston, W. Va., is chief engineer, state highway commission.

Georgia

Many types of state highway pavement were completed in 1930. Among these were 135 miles of concrete pavement, 13 miles of bituminous concrete, 25 miles of bituminous macadam, and 110 miles of surface treatment on lime rock base. Details of the 1930 work are shown in the accompanying tabulations.

Georgia State Highway Completed in 1930

	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	135	20	9-6-9	\$23,500
Bituminous concrete on lime rock	13	21	*	20,500
Bituminous macadam	25	18	6	13,500
Macadam	10	18	8	12,000
Graded and drained	125	32		7,500
Conc. base 2-in. bit. conc. surf. Lime rock base-surf. treat. Surf. treat. on old bases	21 110 6.5	20 21 18	† 8 Light	25,850 18,000 2,000
2-in. penetration on old bases 3-in. penetration on old bases	20 13	18 16	2 3	4,800 5,700

*8-in. base, 2-in. top. †5-in. base, 2-in. top.

The uncompleted work carried over to 1931 included 15 miles of concrete, 10 miles bituminous concrete, 45 miles of graded and drained road and 30 miles of surface treatment on lime rock.

The proposed new construction for 1931 includes the following:

Proposed New Construction for 1931

	Miles	Probable Expenditures
Concrete	250	\$6,000,000
Sheet asphalt	75	1,050,000
Bituminous concrete	40	1,000,000
Graded and drained	200	2,000,000
Surf. tr. on lime rock	150	3,000,000

The average unit bidding price taken on contracts let in 1930 were as follows:

9 in.-6 in.-9 in. concrete paving	\$1.68 per sq. yd.
5 in. concrete base	1.12 per sq. yd.
8 in. lime rock base	1.10 per sq. yd.
2 in. bituminous concrete .....	.78 per sq. yd.
Surface treatment .....	.20 per sq. yd.
Grading excavation .....	.25 per cu. yd.

B. P. McWhorter, East Point, Ga., is state highway engineer.

Florida

State highway work completed in 1930 included 299 miles of pavement and 150 miles of grade, the total estimated cost being \$9,249,000. In addition 3,700 miles of road were maintained at a cost of \$1,751,000. The state highway department probably will have from \$10,000,000 to \$12,000,000 for 1931.

B. M. Duncan, Tallahassee, Fla., is state highway engineer.

East South Central States

Alabama

The principal items completed last year in the 1930 construction program were 60 miles of concrete, 376 miles of gravel road, 91 miles of sand-clay and 78 miles of graded and drained road. Details follow:

Alabama State Highway Completed in 1930

	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	60	18	9-6-9	\$24,000
Gravel	376	18	6 to 9	7,500
Graded and drained	78	26 to 30		5,000
Sand-clay	91	26	6 to 12	6,000
Limerock-asphalt on bit. base and chert sub base	17	18	1½ & 3½	27,800

The uncompleted work carried over to 1931 includes the following:

Uncompleted Work Carried Over to 1931

	Miles	Probable Expenditures
Concrete	84	\$1,680,000
Gravel	184	1,300,000
Graded and drained	109	600,000
Sand-clay	51	300,000
Bituminous surface treated	36	80,000

The construction program for 1931 has not yet been decided.

Worley Finnell, Montgomery, Ala., is state highway director.

Kentucky

The revenues for the state highway commission are made available by two year periods beginning April 1 of each even year. The work authorized by contract and state forces for the period April 1, 1930, to Dec. 1, 1930, was as follows:

	Miles	Approx. Amount
Grade and drain	208.8	\$2,050,000
Bridges under separate contract (not including toll bridges)		628,000
Traffic bound macadam	392.8	2,386,000
Gravel	93.4	312,000
Waterbound macadam	10.2	111,000
Surface treatment (maintenance budget)	328.6	215,000
Retread (maintenance budget)	234.3	659,000
Retread (construction budget)	96.8	682,000
Rock asphalt	98.3	2,190,000
Reinforced concrete paving	234.5	4,990,000
Toll bridge contracts		6,007,000
Total		\$20,230,000

Work by state forces is approximately 7 per cent of total construction work. This type of work is principally reconstruction, low type surfacing, surface treatment and retread.

The program for the remainder of the biennial period from Dec. 1, 1930, to April 1, 1932, is as follows:

Construction:	
Completion of work now under way (including esti- mated overruns)	\$ 8,800,000.00
Projects held in abeyance-net	1,015,000.00
Projects advertised for letting-net	350,000.00
Available for new work-net	2,810,454.55
10 per cent reserve for overruns	417,545.45
Total	\$13,393,000.00
Maintenance	5,500,000.00
Equipment	800,000.00
Toll bridges (\$2,000,000 budget)	1,300,000.00
Administration	500,000.00
Engineering (all budgets)	770,000.00
Interest on warrants	100,000.00
Other expenditures	100,000.00
Total	\$22,463,000.00
Toll bridge program	8,000,000.00
Grand total	\$30,463,000.00

An \$8,000,000 toll bridge program is now under way. Contracts have been let for ten bridges financed by Kentucky and one financed jointly by Kentucky and Indiana. These bridges are as follows:

Location	River	Contract Amount Super and Sub Structure
Boonesboro	Kentucky	\$ 175,696
Burnside	Cumberland	190,656
Canton	Cumberland	373,160
Eggners Ferry	Tennessee	535,642
Paducah	Tennessee	544,634
Smithland	Cumberland	360,332
Spotsville	Green	185,907
Tyrone	Kentucky	297,367
Maysville	Ohio	1,180,760
Ashland	Ohio	579,450
*Henderson	Ohio	1,582,995
Total		\$6,007,601

*Construction jointly by Kentucky and Indiana.

Mississippi

Very little state highway construction was carried out in 1930. There were 34 miles of graded and drained roads completed at an estimated average cost of \$10,000 per mile. In addition 30 miles of graded and drained road were carried over to 1931 for completion requiring a probable expenditure of \$100,000.

The program of new construction proposed for 1931 calls for 75 miles of concrete pavement requiring a probable expenditure of \$1,500,000; 50 miles of graded and drained road, \$500,000; bridges to cost \$300,000; and miscellaneous reconstruction to cost \$700,000.

G. A. Draper, Jackson, Miss., is state highway engineer.

West South Central States**Texas**

Over 670 miles of 18 ft. 6 in. concrete pavement and 294 miles of bituminous macadam were completed in the fiscal year ending Aug. 31, 1930 as part of the state highway construction program. In addition 1.19 miles of brick pavement, 13.89 miles of macadam, 159.83 miles of gravel, 848 miles of graded and drained road, 28.3 miles of caliche and 6.8 miles of shell road were completed.

The uncompleted work carried over to the fiscal year beginning Sept. 1, 1930, included 317.6 miles of concrete pavement, 2.56 miles of brick, 186.89 miles of bituminous macadam, 59.66 miles of gravel, 994.4 miles graded and drained road, 15.4 miles of caliche and 18.5 miles of shell road. The total cost is \$21,808,679.

Details of the construction program for 1931 have not been decided.

Arkansas

The expenditures in 1930 to Dec. 1 amounted to \$18,550,000. The construction included the following: Graded and drained road, 1,150 miles completed and 875 miles under construction; gravel and stone road, 1,182 miles completed and 875 miles under construction; shale road, 12 miles under construction; concrete pavement, 217 miles completed, 81 miles under construction; bituminous concrete, 67 miles completed, 14 miles under construction; bituminous surface treatment, 6 miles completed; asphaltic retread surfacing, 204 miles completed, 94 miles under construction.

The road construction program for 1931 calls for an expenditure of approximately \$15,000,000 and includes the construction of 200 miles of cement concrete and bituminous concrete paving.

Charles S. Christian, Little Rock, Ark., is state highway engineer.

Bonds amounting to \$8,300,000 (net proceeds) have been sold to finance this toll bridge program. These bonds will be retired from revenues derived from toll collections. When bonds are retired the bridges will be made free.

The construction of several other bridges is contemplated by the state highway commission using the above method of financing. Advertisement for letting of approaches to these bridges is set for Jan. 14, 1931, and Feb. 18, 1931, the estimated cost of grading, draining and surfacing these approaches is \$500,000.

H. D. Palmore, Frankfort, Ky., is chief engineer state highway department.

Louisiana

State highway work completed in 1930 included 600 miles of 18 ft. 8-6-8 in. concrete pavement, the esti-

mated average cost per mile being \$24,600. In addition 2,800 miles of 16 ft. wide, 6 in. thick gravel road were completed at a total cost of \$5,000,000. Surface treatment, 20 ft. wide and 1½ in. thick, was applied to 100 miles of road at an estimated cost of \$3,500 per mile.

The construction program for 1931 calls for a probable expenditure of \$55,000,000 and includes the following:

	Miles	Probable Expenditures
Concrete	1,000	\$30,000,000
Bituminous concrete	1,000	6,000,000
Gravel	3,000	7,000,000
Bridges, major		12,000,000

Harry B. Henderlite, Baton Rouge, La., is state highway engineer.

Tennessee

Contract construction completed in 1930 aggregated 1,480 miles of state highway. A total of 643 miles was completed by state force construction. The total expenditure for construction and maintenance was \$33,105,000. The probable expenditures for 1931 are \$25,000,000.

T. C. McEwen, Nashville, Tenn., is chief engineer, state highway commission.

Mountain States**Wyoming**

A 1931 construction program, more than 100 per cent greater than that of 1930, is proposed by the state highway department. The total estimated expenditure for the department is \$5,180,000, of which \$4,000,000 will be for new construction. New construction will include 375 miles of grading and draining, 425 miles of gravel or crushed stone surfacing and 500 miles asphaltic oil treatment.

A comparatively small amount of 1930 work is being carried over to 1931, the total being about \$500,000.

Z. E. Sevison, Cheyenne, Wyo., is superintendent-engineer, state highway department.

New Mexico

State highway completed in 1930 included 315 miles of oil mix surface and 20 miles of concrete pavement. Details of the 1930 work follow:

New Mexico State Highway Completed in 1930				Estimated
	Miles	Average Width Sur- faced Ft.	Thickness In.	Aver. Cost Per Mile
Concrete	20	20	9-6-9	\$70,000
Oil mixed	315	20	3 & 3½	4,200
Gravel, 125 mi. base		22	5	3,000
Graded and drained	125	26		11,000

The uncompleted work carried over to 1931 included 10 miles of oil mix, 5 miles of gravel road and 6.3 miles of graded and drained road.

No program for 1931 construction has been worked out at this time. The amount will depend on action of the state legislature which meet in January, and also to some extent on the legislation of the Federal Congress.

W. C. Davidson, Santa Fe, N. Mex., is state highway engineer.

Montana

A proposition will be submitted to the legislature to authorize the state highway commission to sell \$1,500,000 of gasoline tax anticipation debentures each year for four years. If this bill passes the total revenue of the highway commission for construction purposes, including the proceeds of the sale of debentures, other revenues for construction purposes, and federal aid, is expected to provide a fund of \$6,500,000.

The state highway completed in 1930 was as follows:

Montana State Highway Completed in 1930				
	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Oil mixed	110	18	3	\$ 2,000
Gravel	145	18	7	3,000
Graded and drained	250			10,000

The construction program for 1931, based on the state legislature permitting the sale of tax anticipation debentures, is as follows:

	Miles	Probable Expenditures
Oil Mixed	300	\$ 600,000
Gravel	400	1,400,000
Graded and drained	400	4,000,000

The average unit contract prices for 1930 are shown below.

The bid price for unclassified excavation is the average of all work of this nature constructed during the year and includes a fairly large amount of solid rock. The lowest bid price for prairie grading suitable for elevating graders was 13½ ct. per cubic yard, and the average for that class of excavation was probably about 17 ct.

1930 Average Contract Prices

Item	Quantity	Ave. Unit Cost
Unclassified excavation	4,802,965 cu. yd.	\$ 0.237
Top course crushed gravel (¾ size)	239,642 cu. yd.	1.35
Base course crushed gravel (¾ size)	220,603 cu. yd.	1.17
Stock piled gravel (¾ size)	20,370 cu. yd.	1.16
15 in. corr. metal pipe culverts	8,774 lin. ft.	1.41
18 in. corr. metal pipe culverts	14,380 lin. ft.	1.64
24 in. corr. metal pipe culverts	9,106 lin. ft.	2.24
30 in. corr. metal pipe culverts	2,494 lin. ft.	2.56
36 in. corr. metal pipe culverts	5,090 lin. ft.	4.08
15 in. reinforced concrete pipe culverts	4,460 lin. ft.	1.83
18 in. reinforced concrete pipe culverts	8,106 lin. ft.	2.58
24 in. reinforced concrete pipe culverts	8,440 lin. ft.	3.48
30 in. reinforced concrete pipe culverts	2,002 lin. ft.	4.93
36 in. reinforced concrete pipe culverts	3,000 lin. ft.	6.85
Wire cable guard rail	103,671 lin. ft.	0.45
Class "A" in culverts	2,926.2 cu. yd.	25.19
Reinforced steel in culverts	204,543 lbs.	0.075
Class "A" concrete in bridges	5,079.7 cu. yd.	22.30
Class "D" concrete in bridges	3,025.5 cu. yd.	23.30
Reinforced Steel in bridges	893,722 lbs.	0.061
Structural Steel	2,006,630 lbs.	0.072
Structure excavation for bridges	9,122 cu. yd.	4.44
Treated lumber	1,386.69 m.f.b.m.	87.55
Untreated lumber	351,225 m.f.b.m.	60.94
20-ft. treated timber piles	660 each	19.57
25-ft. treated timber piles	625 each	23.57
30-ft. treated timber piles	210 each	27.35
35-ft. treated timber piles	57 each	31.42
40-ft. treated timber piles	49 each	34.75
45-ft. treated timber piles	8 each	40.00
50-ft. treated timber piles	4 each	50.00

R. D. Rader, Helena, Mont., is state highway engineer.

Utah

New construction carried out in 1930 is estimated to have cost \$2,540,000 for roads and bridges. Details are given in the table.

Utah State Highway Completed in 1930

	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	6.5	18	6	\$25,000
Native rock asphalt	1.0	18	2*	11,000
Bituminous concrete	1.5	18	2*	15,000
Oil mixed	123.0	18	3*	†
Gravel	80.0	18	6	15,000
Graded and drained	20.0			7,000

* On base and on 3 in. gravel.

† \$2,000 oil and \$1,500 regravels.

The uncompleted work carried over to 1931 included 20 miles of gravel road requiring a probable expenditure of \$800,000 and 41 miles of regravelling making a probable expenditure of \$200,000.

The probable expenditure for new construction in 1931 is \$2,705,000 covering the following work:

	Miles	Probable Expenditures
Concrete	5	\$ 100,000
Oil mixed	150	330,000
Gravel	100	1,500,000
Graded and drained	20	170,000
Regravel	—	225,000
Bridges	—	180,000
Miscellaneous (widening, etc.)	—	200,000

The average unit bidding prices for the past three years follow:

Average Prices of Contract Construction Major Items

Item	Unit	1928	1929	1930
Common excavation	Cu. yd.	.35	.30	.20
Intermediate excavation	Cu. yd.	.65	.60	.40
Rock excavation	Cu. yd.	1.10	.90	.80
Overhaul	Sta. yd.	.03	.03	.03
Gravel surfacing				
Exc. crushing and loading	Cu. yd.	.90	.80	.70
Hauling	Yd. mile	.03	.25	.20
Placing	Yd. mile	500.00	500.00	250.00
* Oil processed	Yd. mile		2000.00	2000.00
Structural steel (furn. & plac.)	Lb.	0.8	.07	.06
† Structural concrete	Cu. yd.	22.00	22.00	20.00
‡ Concrete pavement	Sq. yd.	1.20	1.15	1.12
Treated lumber	M.f.b.m.	115.00	115.00	110.00
Piling	Lin. ft.	1.50	1.50	1.25
‡ Reinforcing steel	Lb.	.03	.025	.055

* Includes cost of state-furnished oil but not additional gravel.

† Exclusive of cost of state-furnished cement.

‡ Exclusive of cost of state-furnished steel in 1928 and 1929. Price for 1930 is for steel furnished by contractor.

H. S. Kerr, Salt Lake City, Utah, is chief engineer, State Road Commission.

Nevada

The state highway work completed in 1930 included 84 miles new construction, 197 miles reconstruction, 175 miles oil surface. The total cost, excluding surveys and plans, was \$1,735,000.

The program for 1931 calls for 77 miles of new construction, 133 miles of reconstruction and 226 miles of oil surface. The estimated cost is \$2,500,000.

S. C. Durkee, Carson City, Nev., is state highway engineer.

Idaho

New state highway completed in 1930 included 37 miles of grading, 106 miles of crushed gravel or rock, 4.05 miles oiled road and 5.4 miles concrete road. The estimated expenditure was \$5,200,000.

The estimated expenditure for 1931 are \$1,900,000 for maintenance and reconstruction and \$4,900,000 for construction and betterment.

J. D. Wood, Boise, Idaho, is commissioner of public works.

Pacific States

California

Appropriations for state highway construction are made for biennial periods, the present biennium expiring June 30, 1931. Appropriations for the ensuing biennial period, July 1, 1931, to June 30, 1933, will be made at the coming session of the legislature, and until the biennial budget is approved, it is not possible to formulate a construction program for that period.

For the 1931 construction program it is planned during the next six months to undertake the work remaining in the current biennial budget involving the following construction:

Type	Miles	Approximate Amount
Grading and surfacing	42.5	\$1,201,480
Paving	54.9	1,865,280
Structures		1,091,000
Total	97.4	\$4,157,760

In addition to the above it is anticipated that work proposed for the biennium starting July 1, 1931, will be advertised to the extent of \$14,000,000 prior to Dec. 31, 1931, making the total construction program for the calendar year 1931 amount to approximately \$18,000,000.

The following table shows the state highway work completed in 1930 to Dec. 1:

	Miles	Estimated Average Cost Per Mile
Concrete	111.7	\$39,314
Bituminous concrete	77.1	30,016
Bituminous macadam	16.6	13,581
Grade and oil mixed surface	163.4	14,900
Grade and surface	77.0	29,019
Graded and drained	50.8	33,328

The uncompleted work carried over to 1931, including work incompleted Dec. 1, 1930, and proposed projects, for which bids were received during December.

	Miles	Probable Expenditures
Concrete	42.6	\$1,263,000
Bituminous concrete	56.1	1,492,000
Bituminous macadam	54.5	432,000
Grade and oil mixed surface	144.8	1,522,000
Grade and surface	62.6	1,121,000
Graded and drained	79.5	1,300,000

Average unit bid prices during the past fiscal year were as follows:

Excavation unclassified, per cu. yd.	\$0.42
Portland cement concrete pavement, per cu. yd.	8.69
Asphalt concrete pavement, per ton	4.45

C. H. Purcell, Sacramento, Calif., is state highway engineer.

Oregon

A large mileage of oil-mixed surface was completed in this state in 1930. Other types of state highway completed included 180 miles of bituminous macadam, 10 miles of concrete and 307 miles of graded and drained road. Details of the work follow:

Oregon State Highway Completed in 1930				
	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	10.0	20	9-7-9	\$25,000
Bituminous concrete over old concrete	6.8	18†	Sh. 9; C. 4	20,000
Bituminous macadam	180.0	18	2½	4,500
Oil mixed	144.4	18	1	1,500
Macadam	261.0*	20	8	7,000
Graded and drained	307.1‡	28		15,000

† With 2-ft. 9-in. thick concrete shoulders on each side.

* Includes reinforcing, 187.1 miles.

‡ Includes regrading, 146.8 miles.

The uncompleted work carried over to 1931 comprises 0.7 mile of concrete, 10.9 miles of oil-mix, 112 miles of macadam and 65.8 miles of graded and drained road. The probable expenditure is \$2,000,000. The proposed new construction for 1931 will require a probable expenditure of \$5,000,000.

Roy A. Klein, Salem, Ore., is state highway engineer.

Washington

Over 725 miles of oil mix surface was included in the state highway work completed in 1930. There were also 60 miles of concrete pavement and 239 miles of gravel surfacing completed. Details of the work are given in the accompanying table.

Washington State Highway Completed in 1930				
	Miles	Average Width Sur- faced Ft.	Thickness In.	Estimated Aver. Cost Per Mile
Concrete	60	20	9-6½-9	\$27,000
Oil mixed—heavy	463.1	18	2	1,600
Oil mixed—light	263.5	18	¾	150
Gravel surfacing	239.4	18	—	4,000
Graded and drained	74.0			12,000
Graded and surfaced with crushed stone	40.15	18	7	16,000

The uncompleted work carried over to 1931 included 22.74 miles gravel surfacing requiring a probable expenditure of \$131,700; 87.86 miles of graded and drained road, requiring a probable expenditure of \$2,210,000; and 49.54 miles of grading and surfacing with crushed stone, requiring a probable expenditure of \$1,650,000.

Details of the 1931 construction program have not arms on the Pennsylvania side.

been decided upon, pending action of the state legislature which convenes this month.

Samuel J. Humes, Olympia, Wash., is director of highways.

Contracting Units in Airport Construction

The average modern airport construction consists of the following items according to R. P. Bayard, vice-president, Johnson, Drake & Piper, Freeport, L. I., in a report to the American Road Builders' Association:

Highway Contractor's Unit.—The highway contractor's group of items is:

1. Clearing and grubbing.
2. Excavation, including the general leveling and grading of the area and including dredgefill or imported fill and excavation for all structures other than buildings.
3. Drainage, including storm and sanitary sewer and drain tile.
4. Surfacing of runways.
5. Surfacing of landing areas.
6. Surfacing of hangar aprons and automobile highways.
7. Miscellaneous structures, such as pedestrian subways, guide rails and fences.
8. Topsoil for field to be turfed.
9. Automobile parking areas.
10. Shoulders.

Building Contractor's Unit.—The building contractor's items are:

1. Hangars, including sliding doors, floors, heating, plumbing, lighting and shops.
2. Administration building.
3. Recreational buildings complete.
4. Hotel and club rooms and schools.
5. Grand stand and gateways and pedestrian runways.

6. Service stations, railroad and bus terminal buildings and accessory factory buildings, comfort stations.

Additional Work.—In addition to the above work, there are other items which can generally be let separately to advantage, because of their special nature or because of the length of time required to complete the work; of these items, the principal are:

1. Field lighting for AIA fields, which are equipped for night flying.
2. Turf Building.
3. Furnishings and equipment for all buildings.

Qualification of Contractors.—Shrewd owners and engineers should divide their work into two or more contracts, because there are so few general contractors at this time who are qualified to handle all phases of work necessary in the construction of a modern airport.

ACCURACY OF MASON AND DIXON LINE SURVEY.—Probably the most widely known boundary in the United States is the "Mason and Dixon line" between Pennsylvania and Maryland, run by two famous English mathematicians in 1763-1767. Their work was stopped by Indians, but they had run from the Delaware River to a point about 30 miles beyond the northwest corner of Maryland. The accuracy of their survey is shown by the fact that in a resurvey 130 years later with modern instruments and methods the position found for the northeast corner of Maryland differed only 180 feet from their position. The original stones for 5-mile marks on this line were carved in England from limestone and are still standing, with Lord Baltimore's coat of arms on the Maryland side and the Penn

Notes on Two Important Conventions

By C. N. CONNER
Associate Editor

Ninth Asphalt Paving Conference at Memphis

THE 9th Asphalt Paving Conference, held at Memphis, Tenn., in December, was marked by an excellent attendance which was representative of the entire asphalt industry and included highway officials, manufacturers of equipment and producers of asphaltic materials and contractors. The sessions were unusually well attended and the technical as well as the entertainment program was well selected. Many of the technical program features were committee reports on surveys which were conducted to obtain specific information of national scope. This was a distinct and instructive departure from former program procedure. In the past, the Asphalt Institute program has consisted of papers on individual experiences and, while it has been interesting and instructive, there were always those who felt that these experiences did not apply to their particular conditions.

Insufficient time was available for discussion from the floor, but those who attended the sessions to obtain information felt fully satisfied with the scheduled program.

The outstanding theme of the conference was materials and methods for constructing low-cost highways or reconstructing existing highways, and conversation in the lobby and hotel rooms was commonly directed to these subjects.

One paper particularly stressed the need for simplified specifications for asphaltic materials for low-cost roads. Here, indeed, is an opportunity for the entire bituminous industry to effect standardization and simplification with its unflinching economic results to producer and consumer. It is hoped that the Asphalt Institute, the U. S. Bureau of Public Roads and all other associations, as well as the industry itself, will find a speedy solution to the present chaotic condition which includes more than 125 different specifications for bituminous materials used in this type of construction.

State Highway Officials Meet at Pittsburgh

THE 16th annual meeting of the American Association of State Highway Officials, held at Pittsburgh, Pa., in November, was characteristic of all previous meetings in that timely subjects were ably presented in the addresses, committee meetings were well attended and the resolutions adopted were on subjects of national importance. Nation-wide authorities gave addresses under such titles as "Financing on State, County and Local Roads," "The Practical Application of Highway Transport Surveys to the State Highway System," "The Benefits of Accounting Reports to the Highway Administrator," "Metropolitan Highways" and "The Service Value of a Road."

To those not familiar with the activities and procedure of this association, the absence of discussion at the general sessions may have indicated a lack of interest, but such is not the case because interest was evidenced by the large attendance at these sessions. Discussion at such sessions is not customary. These are always handled by the various committees in their separate sessions.

Other associations and road builders in general realize that state information is authoritative and it is gratifying to know that the American Association of State Highway Officials has formally gone on record, recommending to each state that it maintain a contact man for furnishing information to the many who desire it.

Outstanding among the resolutions adopted are those under the following heads: "Increased Federal Program for Road Building Needed to Aid Unemployment," "Appreciation of Increased Federal Aid," "Removal of Federal-Aid Limitations," "Financing Improvements for Various Classes of Roads," "More Uniform Gasoline Taxes," "More Uniform Motor License Fees," "Funds for Roads Through Public Domain," "Toll Bridges," "Roadside Beautification" and "National Airway System."



Convention Photograph, 9th Asphalt Paving Conference

The Outlook for 1931

ONE bright spot in the construction situation in 1930 was the advance of public works construction to new peak levels. Highway construction, the largest branch of the public works field, showed an increase of 10 to 12 per cent over the previous year. There is every indication that there will be even greater activity in this field in 1931.

Information submitted in November and December by the various state highway departments to the American Road Builders Association showed that the estimated expenditures of the 48 states for state highway construction and maintenance in 1931 aggregated \$840,850,000. These estimates are shown in the accompanying tabulation. A survey also was made by ROADS AND STREETS in December, results of which are given in some detail elsewhere in this issue. In some states a definite program had not been decided upon, pending action of the state legislatures. Over 40 states have legislatures convening in 1931. In view of the general sentiment for more highway construction, not only for the relief of unemployment but because of the urgent necessity for additional improved roads, there is little doubt but that the legislative action will be favorable to increased highway activity.

There is no doubt but that there will be an increased amount of Federal aid road construction in 1931. The \$80,000,000 fund approved by Congress on Dec. 20 for emergency construction to increase employment has already been apportioned to the various states. This makes it possible to spend \$160,000,000 for Federal aid work without providing any money from state sources. On Nov. 30 the Federal aid funds available to the states for new projects amounted to \$155,383,877.

Additional funds for highway purposes were provided by several states at the election last

November. The citizens of Louisiana authorized the issuance of \$75,000,000 of bonds and as a result the state is undertaking a greatly increased construction program this year. An \$85,000,000 bond issue was authorized in New Jersey and a \$2,800,000 bond issue was carried in Wyoming. Maine earlier in the year authorized a \$15,000,000 bond issue. Several other states are contemplating bond issues and it is likely that their state legislatures will take some definite action on these matters in the coming sessions early this year. Among the bond issues for road purposes that will be considered by the 1931 legislatures are the following: Arkansas, \$15,000,000; Idaho, \$10,000,000; Maryland, \$4,500,000;

Minnesota, \$10,000,000; Texas, \$175,000,000; West Virginia, \$25,000,000 to \$50,000,000. In the county and township field it is estimated that the expenditures for 1931 will be over \$800,000,000. A questionnaire sent last fall by ROADS AND STREETS to county officials brought 500 replies. These showed that the 500 counties proposed to expend approximately \$83,000,000 in 1931. Of this total \$48,205,000 was for new construction, \$30,737,000 for maintenance and \$4,222,000 for purchase of new equipment. These were average counties, neither the large nor the small predominating. In fact none of the larger counties in which big cities are located, such as Wayne County, Michigan, Erie County, New York, Allegheny County, Pennsylvania, or Cook County, Illinois, were included. The annual expenditure in any of these counties is far greater than the sums spent by some states on state highways. The above figures relate only to work on county highway systems. They do not include the large expenditures by the several thousand townships.

Summing up: Prospects are indeed bright for much larger programs in 1931 in the road and street field.

Estimated Expenditures on State Highways in 1931

State	Construction	Maintenance	Total
Alabama	\$14,700,000*	\$1,200,000*	\$15,900,000*
Arizona			6,500,000
Arkansas			15,000,000
California			30,000,000
Colorado			5,000,000
Connecticut	10,100,000	2,500,000	12,600,000
Delaware			2,200,000
Florida			12,000,000
Georgia	15,000,000	3,000,000	18,000,000
Idaho			5,500,000
Illinois	29,000,000*	2,600,000*	31,600,000*
Indiana			24,000,000
Iowa			30,000,000
Kansas	10,000,000*	3,700,000*	13,700,000*
Kentucky			20,000,000
Louisiana			30,000,000
Maine	11,000,000	2,100,000	13,100,000
Maryland			11,000,000
Massachusetts		2,100,000	20,000,000
Michigan			30,000,000
Minnesota	10,500,000	4,500,000	15,000,000
Mississippi			6,000,000
Missouri	28,000,000	5,500,000	33,500,000
Montana	4,000,000*	500,000*	4,500,000*
Nebraska			10,000,000
Nevada			3,000,000
New Hampshire			5,500,000
New Jersey			36,000,000
New Mexico	4,350,000*	1,300,000*	5,650,000*
New York			60,000,000
North Carolina			11,000,000
North Dakota			3,500,000
Ohio	19,000,000	15,000,000	34,000,000
Oklahoma			16,000,000
Oregon			10,000,000
Pennsylvania			60,000,000
Rhode Island			4,300,000
South Carolina			22,500,000
South Dakota			6,000,000
Tennessee			12,000,000
Texas	33,000,000	12,200,000	45,200,000
Utah			4,000,000
Vermont	3,300,000	1,800,000	5,100,000
Virginia	11,000,000	6,000,000	17,000,000
Washington	9,700,000*	2,800,000*	12,500,000*
West Virginia	11,400,000	3,000,000	14,400,000
Wisconsin		3,000,000	33,000,000
Wyoming			5,000,000
Total			\$840,850,000

*No estimate returned. Expenditure dependent on legislative action. 1929 figures used.

EDITORIALS

Hoover's Program for Public Works in 1931

IN his recent message to Congress President Hoover reviewed with satisfaction the success of his plan to reduce unemployment by increasing expenditures for public works and public utilities. He pointed out that in 1929 certain classes of this sort of construction totaled \$6,300,000,000, as compared with a total of \$7,000,000,000 in 1930, but he added that construction of other classes has decreased. Although he did not say so, it is well known that building construction has decreased, dwellings in particular showing a marked falling off. He said:

"It has been the universal experience in previous depressions that public works and private construction have fallen off rapidly with the general tide of depression. On this occasion, however, the increased authorization and generous appropriations by the Congress and the action of States and municipalities have resulted in the expansion of public construction to an amount even above that in the most prosperous years. In addition the co-operation of public utilities, railways and other large organizations has been generously given in construction and betterment work in anticipation of future need."

Then he proceeded to urge Congress to appropriate an additional \$150,000,000 for construction, so as to bring the total of federal construction up to \$650,000,000 during the next 12 months. He mentioned particularly highways, waterways and public buildings as the main types of federal construction that should be speeded up. He said: "In connection therewith we need some authority to make enlarged temporary advances of federal highway aid to states." Even without the additional \$150,000,000 now requested, the President shows that the federal government has already appropriated \$520,000,000 for construction during the fiscal year of 1931, as compared with \$253,000,000 during the fiscal year of 1928.

By setting such an example of federal liberality in appropriations for public works, it is probable that many state legislatures will join with Congress in making 1931 the greatest construction year yet witnessed in the field of public works. That 1930 has been a record breaker in this field is now known. That 1931 will surpass the 1930 record is beyond much doubt, for the Hoover plan has already met with almost universal approval.

A Proposed Method of Eliminating the Business Cycle

CHARLES F. KETTERING, Vice-President of General Motors in Charge of Research, has been quoted in these columns before. The present quotation is one that gives emphasis to a new phase of research. We quote from a recent article by Mr. Kettering in *The Saturday Evening Post*:

"People are saying that unemployment is inevitable

because labor-saving devices are constantly releasing men to the ranks of the unemployed. But may I ask: Are our present numbers out of work because they have been released from established industries, or because they have not been absorbed by new industries?"

"American industry owes it to itself and to the nation and to the world to organize itself so that it can look toward the future. It must be constantly developing new industries to take up the slack of unemployment that its own constantly increasing efficiency causes. It must try to plan ahead, to figure out what people will need in five, ten, fifteen or twenty years, and to work toward getting the needed product into production."

To scientists, inventors and far sighted business men the world owes nearly all of the industrial progress that has been made during the last 150 notable years. But seldom have the men who are responsible for this progress paused long enough in their daily routine to address the public as Mr. Kettering addresses them in the article from which we have just quoted two paragraphs. A new type of researcher has arrived, a type that is interested not merely in the engrossing physical problems before him, but also in broad economic problems. Research, to men of Mr. Kettering's type, has an economic function of the utmost importance, namely the function of providing men with new work as fast as invention render their services unnecessary in old work.

While it has long been recognized by students of economics that inventions have created new jobs almost as fast as they destroyed old ones, it has been taken for granted that a little hiatus must inevitably occur between the loss of an old job and the finding of a new one. Now comes the suggestion that no such gap is necessary, and that economic research will disclose ways of altogether avoiding unemployment periods.

Surely the brains that are capable of creating entirely new and great industries, like the motor-car industry, are also capable of devising methods of ironing out the wrinkles in the business cycle. The trouble has been that hitherto original brains have not devoted their creative energies to the solving of this economic problem. Admittedly the problem is complex, for it involves not only a great many industrial concerns but a complex interchange of their products. Nevertheless it does not present a hopeless aspect. Even were the aspect as hopeless as it now seems to some intelligent men, to the ideal researcher it would wear a cheerful look; for to such a man scarcely anything that can be conceived seems impossible of realization. The more difficult it appears to be the greater is the desire to become master of the difficulties.

May we suggest to all companies that have researchers on their payrolls, this procedure in the interest of humanity: Let each company send a research representative to a congress of creative intellects, for the purpose of initiating researches that will lead eventually to the complete elimination of the business cycle.

H. P. Gillette

Practical Local Road Improvement Plan

THERE is a general belief that all reform and progress in public affairs begins with legislation permitting, or requiring, certain things to be done in a certain way. As a matter of fact, every worth while development in our economic and political life began outside the law; proved its right to consideration in spite of the law, and has been legally adopted only after its success had been demonstrated. This is not intended to minimize the great value of proper legislation because it is only after such steps have been taken, that the benefits of improved methods of doing public work become general.

We have received many favorable comments on the proposed revolving fund for construction of local roads which was discussed in detail in the October *ROADS AND STREETS*. There is nothing new in the suggestion. In fact, it is applying to public business the same principles that practically every private business has used for a long time. In the November issue of this magazine we published a letter from K. I. Sawyer of Ishpeming, Mich., telling how Marquette County has successfully used the same plan for five years in financing local roads for townships.

Basically, the whole proposition can be summed up in these words: create a fund from which local road improvements can be paid for, the money to be returned to this fund by the payment of an agreed portion of the cost each year for a period of years.

It would be good business and practical economy for every county and city, as well as the various states, to create such a construction fund and get away from the expense and annoyance of small improvement bond issues and the technicalities that constantly interfere with special improvement district road work whether the work be done in city or rural communities.

Now that the legislatures of the various states are going to get together to consider ways and means of community development and particularly to consider how the public may get one hundred cents' worth of work for a dollar, we would earnestly urge them to give consideration to some such plan as has been suggested.

The widest possible latitude can be given to counties or townships in deciding what portion of the cost of such improvement shall be paid by the public. People who want to build roads should not be prevented from doing so, provided they are willing to pay the cost of such improvement. For that reason, we believe that the states can well afford to create a permanent construction fund available for the payment of road improvements under such rules as the legislation or trustees of such fund shall create. The money may be repaid in a specified number of annual installments without interest if paid when due, otherwise to become a lien against the property the same as taxes and, of course, in that case, the fund would be reimbursed through the tax sales now provided for in every state.

As previously pointed out, if these payments were spread out over ten years, the use of the money would constitute the equivalent of 30 per cent of the cost on a 6 per cent basis and would thus provide very substantial state aid for this work. Counties or townships,

under whose supervision such work would be done in different states, should grade and drain the roadway from public funds and if public sentiment favors the payment of a part of the cost of surfacing, this would undoubtedly greatly accelerate the building of these farm to market highways.

While the suggestions made by us have placed particular emphasis upon making this plan apply to the purely local road in which only the people living along it are directly interested, the plan of financing would, of course, work out to great advantage in all types of secondary road improvement, particularly where a part of the cost is to be paid by benefited property owners in both urban and rural municipalities. Many suggestions have been made as to funds that should be preserved intact under public custody and which would, therefore, seem to be particularly suitable for the purpose of financing this work. One of these suggestions deals with unclaimed bank deposits of which there are many millions in each of the more populous states. If the banks were required to turn such deposits over to the permanent construction fund trustees after a period of five years, a record could be kept of them and at any time the owner, or his heirs, appeared to claim such funds, the principal would be available. Of course no interest would be paid because none is collected.

Unclaimed estates, while not amounting to such great sums, would certainly be put to a highly useful purpose by being placed in such fund and the money would be kept intact if any heirs should appear. Provisions should be made for the acceptance by the state or by its political units of trust funds from individuals to be used either permanently or for a fixed terms of years in this work.

The writer has mentioned this to more than one individual of large means to get their viewpoint as to whether such use of their money would be considered practical philanthropy and the response has been highly favorable.

May we suggest that those interested in this matter call the attention of their representatives and senators in their respective state legislatures to this proposed plan which can be summed up briefly as follows:

First, the creation of a permanent construction fund either exclusively for road building, or available for road building;

Second, provisions for allotment to counties upon application by the proper officials and the guarantee by the county of the collection and the repayment of money on the terms prescribed, or agreed;

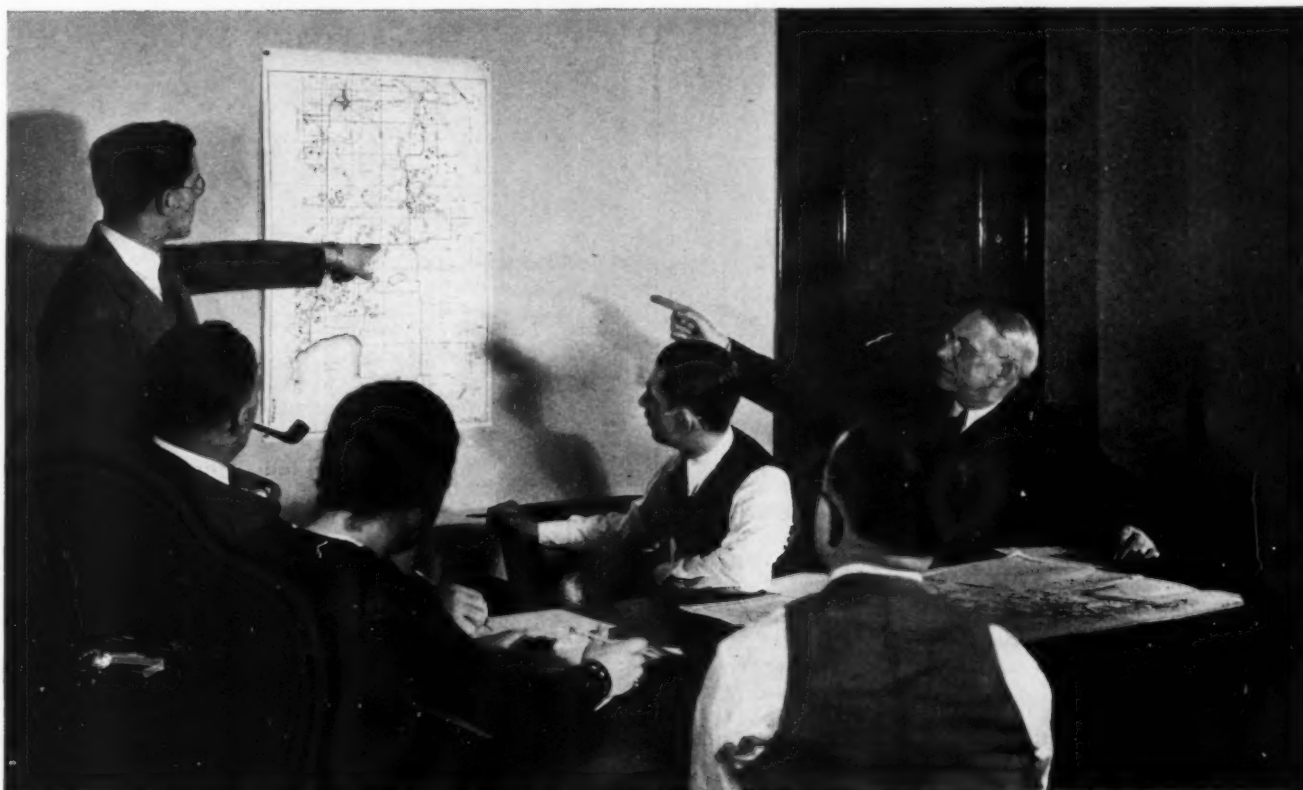
Third, the payment from the fund of the cost of surfacing roads in special road improvement districts to be created upon the petition of the property owners, such payment to be made only after both the contract for the improvement and the assessment roll for the repayment of the money shall have been approved by the proper representatives of the property owners of the district,

Fourth, provisions for the increase of such fund from public and private sources and such regulations for its management as shall be deemed necessary.

Joe L. Long

County and Township Roads

A Section Devoted to the Interests of Those Responsible for Secondary Road Improvement



The County Commissioners Map Out a Program

Every Farmer's Gate a Shipping Point

[[What Educational Work Is Accomplishing]]
for the Cause of Farm-to-Market Roads

By NORMAN M. BLANEY

Director, Farm-to-Market Road Department, American Farm Bureau Federation

FROM the standpoint of American agriculture there is no question as to the economic and social necessity of an adequate farm-to-market road system. Unless the farmer has a highway from his front gate to his primary market, passable 365 days in the year, he is seriously handicapped.

Such is the case with approximately 80 per cent of the farmers in America. Nearly 5,000,000 farms are situated on dirt roads, impassable during many months of the year. It is not for the farmers living on these impassable dirt roads to say when they will sell the product of their toil. The controlling factor is the condition of the dirt road over which their crops must be hauled. The seriousness of this situation from the economic, the social, the educational, the medical, the fire-hazard and the young people's standpoint cannot be over-emphasized.

As to the desirability, in fact the absolute necessity, of farm-to-market roads, there is no question. The

future progress and prosperity of American agriculture absolutely demand farm-to-market roads.

Unfortunately the obtaining of such highways involves numerous economic, engineering and political problems. And to help the farmer of America solve those problems and secure for themselves year-round roads, the American Farm Bureau Federation has, during the past year, contributed the resources of its entire organization—national, state, county and community.

From the early beginning of the American Farm Bureau Federation back in 1919, the importance of our rural highways as factors in the welfare of farmers has been insisted on. When the question of federal aid for highway construction became an issue in Congress, the Farm Bureau arose as champion of interstate roads for business purposes rather than for pleasure drives. The educational campaign embarked on at that time, engineered the nation into the proper conception of the kind of roads most needed by the farm-

ing class. Not broad boulevards for fast driving, but roads that would serve as arteries of commerce, were what we proposed at that time.

It was not, however, until the beginning of 1930 that our farm-to-market road program became a major project of the organization. Our board of directors, after due deliberation, instructed our executive officers to establish a new service at national headquarters in Chicago, for the conduct of the campaign the aim of which is to promote the construction of farm-to-market highways.

Just the other day there came to my desk a brief line which epitomizes what has been accomplished in the interval since the launching of our program. One of our organization field workers had been on a speaking trip through the state of Connecticut and at its conclusion he wrote out a report to national headquarters. The quotation from that report which was sent to me from our secretary's office says this: "Farm-to-market roads are gradually being incorporated into the thinking of the Connecticut farmer."

And that, my friends, is something which is becoming quite generally true all over the United States. Farm-to-market roads are gradually being incorporated into the thinking of our farmers. I believe I am not overstating it when I say that the thought is practically unanimous.

It is significant, too, that the phrase, "farm-to-market roads," has taken on a definite meaning and is well understood. More and more it is being recognized as essential to the prosperity not only of the farmer but of the city dweller as well. Thoughtful leaders are seeing that it is one of the factors which will build for a permanent national prosperity. Politicians are beginning to realize that it is a movement they should get behind. The term, "farm-to-market roads," carries a definite meaning and it is being given most serious consideration as it becomes incorporated into the thinking of our farmers.

Demanding Low-Cost Roads.—Farmers *want* good roads on which they can depend the year around for their transportation needs. I would not wish to suggest that we should cease our efforts to make them further conscious of that need. That work must con-



A Gravel Surface Makes a Serviceable Road Up to a Certain Density of Vehicle Traffic

tinue. I do say, however, that this educational campaign should be expanded to include a spread of the knowledge that year-round roads are possible *at low costs*. This fact has not yet sunk home into that farmer mind typified by the report from Connecticut. Farmers do not yet realize that their community *can* afford year-round roads from their front gate to their market place.

I am minded here of an incident occurring at a road meeting in which I participated out in a western state not long ago. The farm bureau organization was talking road improvement for all it was worth, and the editor of the local newspaper was fighting the proposition with all the vim and vigor country editors can throw into a cause they feel is righteous. In our meeting this editor told of driving just a week previous over a stretch of road some hundred miles distant which struck him as the type of road for which the community should strive. "But we don't have the money to build that kind of road," he insisted.

It happens, however, that the stretch of highway to which he referred was not an expensive type of road. It had been built for \$4,000 a mile, not the \$30,000 or more which the editor thought it cost. And I can imagine you will understand his feelings when that fact was brought home to him. His understanding of the matter is, however, typical of much rural thinking on the cost of roads. Most farmers, and too many county commissioners in rural regions, seem to think there are only two types of highways—one of them gravel, etc., roads, the other the most expensive type.

On my trips around the country I find very little exact information among county and township elected officials on this matter. They know little or nothing about the different types of treatments for gravel roads to make them satisfactorily serviceable without involving a tremendous cost. The consequence is that these men immediately start talking about expensive types of pavement, although failing to consider that they do not have sufficient money to expend on such construction. Nor do they have the traffic that would justify this expenditure and they are at a loss to know what to do about it all.

Every local highway officer and the great majority of the country people know what cement is as a road material. Yet an extremely small percentage have any acquaintance whatever with the various types of bituminous treatments, nor do they see where bituminous materials fit into the program of road construction.

I would add here that our organization has no quarrel with the advocates of the more expensive types of roads. If there is money enough and the traffic justifies it, we



Marketing Produce: Miles of Serviceable Low-Cost County Roads Led to This Concrete Highway

are for them 100 per cent. Those roads must be built where they are needed but we want these others, too, because so much more ground can be gained. There is need, however, of a campaign to spread knowledge of the less expensive types of farm-to-market roads.

It may be that some attention should be given to the importance of gasoline funds being used exclusively for farm-to-market road construction purposes. In some places there is a tendency to absorb this revenue in expenditures for administrative expenses. It is not difficult to collect and every effort should be made to see that the funds are properly expended on farm-to-market road construction.

Farm Bureau Campaign.—And now to the story of the American Farm Bureau Federation's educational campaign to interest the nation in year-round farm-to-market highways. It is a story which deserves from the advertising world a great deal more attention than it has yet elicited. Some national advertisers are of the opinion that to make the nation conscious of its need for some particular commodity a million dollars or so is needed. The farm bureau has had a more modest war chest at its disposal and yet we feel that with the means at hand we have rather well blanketed the nation and secured real results. Our accomplishments are due entirely to the nature of our organization.

There are some 15,000 township groups organized. The county farm bureaus number 1,837 and the state federation allied with the national organization number 43. In this membership we count more than a million and a quarter farm families. It is the largest organization of farmers in the history of the world, and its potential influence for shaping the course of events is tremendous. It has been our task and our pleasure this past year, to arouse in this vast army of farm families, the desire to do something about their farm-to-market highways, and we have kept at it pretty much 24 hours out of the day.

In our intensive national educational campaign the



A Hennepin County, Minn., Traveling Library at a Crowded One-Room School

story of farm-to-market roads has been carried to the remotest hamlet. The printed page, the public speaker, the radio, the motion picture and numerous other educational and publicity media have been utilized to further the message of the economic and social advantages of farm-to-market roads. It has echoed from coast to coast; from the humblest village hall to the office of our nation's chief executive.

Publicity Campaign.—On every possible occasion the farm-to-market message has been featured in addresses of the farm bureau executives, delivered at strategic points where the influence of the speech would radiate widely and cause discussion. You may not realize how closely the farm bureau is knit into the public life of the nation, but in our audiences have been governors, senators, congressmen, officials who keep their ears to the ground and make hay for their own purposes when-



The Farmers Want Good Roads



Grading for a New Location Is the First Permanent Step Toward Construction of a County Road

ever the time is opportune. I do not say that deprecatingly because the wise statesman is he who acts as his constituents dictate. And it is indeed a significant fact that the high ranking officials of our government are interested in finding out what the farm bureau members are thinking. Add to those higher-ups the state, county and township officers who attend and participate in our meetings and you will realize that these addresses have been of immense value in promoting interest in our program.

Practical Results.—As the first definite and practical step towards farm-to-market roads, the American Farm Bureau Federation has strongly advocated the organization of state and county road committees, for the study and analysis of particular road problems and the development of a workable farm-to-market road plan.

The results have been most encouraging. Up to Nov. 25, 1930, state farm bureau road committees had been organized in the following states:

Ohio	Kentucky	New Jersey
Illinois	Minnesota	New Mexico
Iowa	Mississippi	South Dakota
Wisconsin	Nevada	Texas

County road committees had been organized on that same date in 251 counties in 29 states. This list is being added to daily and before the year ends we are expecting to have road committees active in 300 counties—the objective of this year's endeavor.

The organization of road committees has been the first step in our program. And when it is realized that through these road committees, whose members are farmers, contact is had with actual road-building activities, it will be seen that it is a very important step. An actively functioning road committee, giving time and thought to the local road situation, planning out a county-wide system, devising the most effective ways to secure it, considering the best use of funds available and consulting with highway engineers, road commissioners, finance officers and business interests of the community, holds an enormous power for securing direct results. Every one of these committees is a potential nucleus for a road-building program of considerable

importance. This list of county road committees is being added to daily and the part they play is bound to increase in importance as the possibilities of their work dawn upon them.

Thus far our work has been largely preparation. Remember that men who guide the plows down the long furrows of our agricultural empire are actuated by an abiding principle which means much. Having once put their hands to the plow handles they do not like to turn back, and it will be well to ponder that.

The International Pacific Highway

The first definite action for the building of an international highway 10,000 to 12,000 miles in length was taken last month when the First International Pacific Highway Conference met at Los Angeles, Calif. The conference was attended by 34 delegates, 10 being from the United States and 24 from Mexico. As proposed the highway will start in Alaska and will follow the shores of the Pacific, crossing the Equator and the Andes and terminating upon the Atlantic Ocean at Buenos Aires. A plan for financing the construction of the highway through Mexico, proposed by Gov. Filberto Gomez, President of the convention and personal representative of the President of Mexico, was adopted. This plan provided that steps be taken to proceed immediately to the formation of a nation-wide International Pacific Highway Association in Mexico with branches in every state affected:

To take definite steps toward the crystallization of sentiment in Mexico for this highway and in securing the co-operation of the local and national chambers of commerce;

To arrange with each Mexican state to make an earnest examination of its ability to finance whatever section of the great highway is to run through its territories. After this ability has been assessed, to take up the matter of further financing with the Mexican Federal government. When the extent of possible Federal co-operation has been ascertained, then to examine into other and further means of financial aid for the highway.

Cameron County's
Trucking Requires
Heavy-Duty Pavement

By OSCAR C. DANCY

Judge of County Court,
Cameron County, Tex.



A County

SHOULDN'T BE AFRAID *of Its Road Problem*

WHEN one looks at the map of the United States, he may see that lower neck of Texas as a sort of jumping-off place. This was perhaps true up until about a decade ago, but today the lower Rio Grande valley, as it is called, is one of the most flourishing agricultural communities in the world—a self-made achievement that goes hand-in-hand with road improvement.

The southernmost county in Texas is Cameron, along which curls the Rio Grande on its last march to the Gulf of Mexico. Where formerly cactus and mesquite covered the land, you will find vast acreages of citrus fruit trees and vegetables. The largest city is Brownsville, with only 25,000 people, a city 500 miles further south than Los Angeles and some 40 miles south of Palm Beach. Cameron County pioneers early realized that if their community was to become an active part of the United States the county would have to be made attractive.

To do this they built roads. Good roads were necessary to such a community, for its rich and sandy soil had a pronounced affinity for moisture, and when it rains in southern Texas one can scarcely walk through the gumbo, let alone operate a vehicle. Cameron County soil lends itself to the production of fruit and vegetables of a perishable nature and many a farmer in the early days saw his crop spoil before his eyes because of the impossibility of moving it to market.

Out of the Mud.—A highway plan was created with the objective of placing every farm in Cameron County within a mile and a half at least of a concrete road. This objective has almost been reached, for at the end of the 1931 Cameron County will have about 275 miles of pavement linking all sections of the county and all cities and towns. We have 228.85 miles now.

The question naturally arises, How was this typical

agricultural community, so under-developed, able to pull itself out of the mud so quickly?

It is a very easy matter for citizens of a community to sit down to plan measures of road relief, but it is quite another matter to crystallize ideas and carry them out to the time when paving mixers are actually in operation. Although in Cameron County we went through the usual preliminary skirmishing, the writer and a group of Cameron County business men and farmers formulated what we considered to be a comprehensive highway plan that could be carried out by the county without undue tax burden on the citizens. Our first problem was to determine as far as we could what the future held forth for Cameron County in the way of population, and the consequent motor-car usage. It appeared obvious to us that Cameron County would forge ahead rapidly if good roads were provided. In view of the intense cultivation carried on, we determined that a hard-surfaced roadway would be necessary for we did not wish to make the mistakes we found in other communities where inadequate planning and road building brought additional highway worries which were largely evidenced through exorbitant maintenance costs. Road-building activities of near-by communities and of communities in other states were thoroughly investigated and we determined that concrete pavement was best suited to our purpose. We then calculated the mileage of pavement that we needed and very carefully determined how much our citizens could afford to pay.

Bond Issue Approved.—We did not wish to build our pavements in a piecemeal fashion. We needed them at once. Naturally, then, we turned to the bond-issue method. Although we who were sponsoring the plan deemed it best to adopt an issue for \$3,000,000, the will of the voters was for an issue of \$6,000,000, which was approved in 1927 by a vote of nearly four to one. To

get this bond issue passed we had to do considerable educational work among our people. Meetings all over the county were held and the whole situation was carefully explained especially the tax feature.

I had estimated that the total tax rate for Cameron County would be raised to \$1.75 per \$100 of assessed valuation because of the bond issue. I purposely gave a high estimate in order to play fair with our taxpayers. Subsequently, when the bond issue was in effect we found that my original estimate was too high. In fact, the total tax rate for 1929 for all county purposes, and including the \$4,000,000 worth of bonds issued up to that time, was but \$1.42 on each \$100 valuation of property—a reduction of 8 ct. over 1928.

So on the one hand we have had an extremely low charge or tax levy for the highway bond issue. The annual levy for each million of this bond-issue purpose does not exceed 18 ct. On the other hand, when we consider the tangible benefits that have accrued through the pavements we feel that our good roads are costing us nothing. For instance, our hard-surfacing reduced upkeep costs to about \$25 per mile yearly.

In determining taxes in Cameron County land has always been evaluated at a low figure. For instance, \$50 per acre is our minimum on ordinary irrigated land, whereas sales are seldom below \$200 per acre. On an average, land is valued at just about one-third of its real value.

Benefits Immediate.—The installation of our pavements started immediate gains in county wealth. In the years from 1922 to 1926 the gain in worth of property amounted to but \$7,000,000, whereas in the year the pavement program was started assessed valuations increased nearly \$7,000,000. In 1928 they jumped another \$7,000,000 and in 1929 \$4,000,000 additional—this in the face of the fact that we have not tampered with our method of property valuation. These gains are largely attributable to building and land improvement as stimulated by our pavements.

It is quite clear to the citizens of Cameron County who have watched its development that our amazing activity in agricultural lines is directly due to our building of good roads. Down here we fondly speak of Cameron and the adjoining counties as the "Magic Valley," which it truly is. Until about 1905 it was largely settled by poor Mexicans who somehow eked out a living among the cactus and mesquite growths. Farmers began trekking in for they were attracted by the extremely rich soil, the soil that produces the best grapefruit in the world. But mud was against these early farmers and even though a few small irrigation projects had been started the lot of the early farmer was not a happy one. But as we began improving our roads, an operation which at first consisted entirely of grading earth, more and more outsiders entered the valley. Irrigation districts were formed quite rapidly



Left—Boca Chica Road, an 18-Ft. Pavement in Cameron County, Tex. Right—Facilities for the Rapid Trucking of Vegetables Are Essential to Cameron County Farmers



Two Views on State Highway 12 in Cameron County, Tex.

and in 1927 there were 12 districts. But since the inauguration of our paving program, which we feel was one of the large attractions for new blood, we have increased the number of irrigation districts to 18 in Cameron County alone, which now serve some 4,000,000 acres. Citizens of the "Magic Valley" are not yet ready to stop. Twenty million dollars is the estimated cost of irrigation projects now in process of construction. We are going to build a dam, when negotiations with the Mexican government are completed, across the Rio Grande which will provide an adequate supply of water for all future developments.

No Halfway Measures.—In my travels about the United States I have entered many rural communities with resources equal to those of Cameron County, and communities with populations even larger. It strikes me as unfortunate that so many of these communities should still be in the throes of solving their traffic problems, whereas we in Cameron County are no longer worried. In Cameron County it was early realized that the problem of building roads was a real problem and that halfway measures would not suffice. We calculated that we would have to sacrifice to get adequate pavements. Our citizens marched to the polls and, by a vote of four to one, carried our highway bond issue. We now have practically all of our important routes paved which means that our pavements are paying us dividends which are as remunerative to us as were early investments in General Motors stock to many people.

We who have witnessed Cameron County's phenomenal growth are not at all puzzled about it. We have faith in our community, a faith that enabled us to go ahead and build the things that we needed. When I think back to the time when we had no pavements in the county and when hauling costs were high with tremendous fruit and vegetable spoilage, it strikes me that it would have been good business for Cameron County to have paved all these roads even if the cost had been several times what it actually was.

As for the actual construction of our concrete pavements, we had to circumvent difficulties that usually are not faced. Many of our routes are through sandy terrain. All the material excepting water had to be imported. Perhaps because we have so much to do in the way of road building and in the way of providing irrigation, we were more careful in the spending of our money than most communities. Cameron County was the first county in the south and about the second in the United States to use the new specifications prepared by the Portland Cement Association. We found these to be entirely practicable and certainly economical because we were able to build stronger roads than formerly and at a cost of approximately \$2,000 a mile less. We calculate that this step saved us around a half million dollars or enough to pave some ten miles additional.

If I may be permitted to be philosophical, I must say in conclusion, that the road problem is not as serious or as incapable of solution as many communities believe. Cameron County with 77,000 persons met the road problem squarely and now that our pavements are in, the task of building and paying for them was and is comparatively easy. No one would think for a moment of going back to the old tax rate of 80 ct. on \$100 before we had the concrete work.

In 1928, Dallas County, Tex., authorized a \$6,950,000 bond issue for the construction of an enormous bridge and road building program. Good progress is being made.

Township Supervisors in Pennsylvania Vote on Suggested Change

A questionnaire recently sent out to township supervisors in Pennsylvania by the Pennsylvania Road Builder, official organ of the State Association of Township Supervisors, was given the following comment in that paper:

During the past year there has been considerable interest displayed in some of the suggested changes in township laws. In order to determine the sentiment of those interested, particularly township officials, the Road Builder is engaged in sending out a questionnaire containing a list of eight of the more important changes that have been under discussion. Several questions involved in the list are not included in the report of the Township Law Revision Commission, nor are they sponsored by the commission, they could, however be introduced as separate bills by those interested in their passage, it is therefore important that all who are interested express their sentiments either for or against all the proposals in the list.

As the legislature will meet next January, when such changes that are to be made will be introduced, many of the members of the legislature will be interested in knowing how township officials stand on the questions involved.

Not enough time has elapsed since mailing the first ballots for us to have received any great number, but they are now coming in, and we are able to give the results of those received up to this time.

Following are the questions, and the votes recorded so far:

	Favor	Oppose
Do you <i>favor</i> or <i>oppose</i> the plan to abolish the office of Supervisor and place all Township roads under control of the County.....	6	79
Do you <i>favor</i> or <i>oppose</i> the plan to prohibit Supervisors from selecting their Secretary or Treasurer outside of members of the Board....	18	66
Do you <i>favor</i> or <i>oppose</i> the plan to prohibit Supervisors from acting as Road Masters or Superintending the work on roads and receiving pay for their services.....	18	65
Do you <i>favor</i> or <i>oppose</i> the plan to dispense with State approval of all contracts or purchases over 500.00 and substitute the requirement that such contracts or purchases shall be advertised for bids.....	26	55
Do you <i>favor</i> or <i>oppose</i> the plan to require Supervisors to advertise for bids for the purchase of road building material and equipment.....	25	59
Do you <i>favor</i> or <i>oppose</i> the plan to extend State Reward to include the purchase of road building machinery and equipment.....	63	17
Do you <i>favor</i> or <i>oppose</i> the plan to increase the payment of State Reward to 50 per cent, or 75 per cent of the actual cost of the work, instead of the present method, of paying 50 per cent or 75 per cent of the estimated cost not to exceed the fixed amounts, which are in many cases much lower than the actual cost..	77	5
Do you <i>favor</i> or <i>oppose</i> the plan to secure one cent of the gas tax as a permanent fund to be used for the payment of State Reward in the construction and maintenance of Township roads	77	6

The shortest and narrowest paved motor road in existence is believed to be the road on Smith's Island, one of the little islands in the lower Chesapeake Bay, near Crisfield, Md. It is less than a mile long and just wide enough to permit the passage of one motor car at a time.

What Reasonable Expenditures Can Accomplish

A few years ago, this road, west of Wytheville, Va., was a fit subject for the contractor



A low-cost surface eliminated the obnoxious conditions shown in the view above



Before and After Pictures from Virginia



An impassable road was the reason this Virginia doctor got there just too late



This bit of construction (compare with illustration above) has more than paid for itself already

The Road Builders' News

Cooperative Activities of County Highway Officials Division

In order to enlarge its scope of activity by reaching organized groups active and interested in promoting better roads, the County Highway Officials' Division of the American Road Builders' Association has engaged in cooperative activities with the National Rural Letter Carriers Association, the American Farm Bureau Federation and the American Automobile Association.

National Rural Letter Carriers' Association.—The Rural Letter Carriers have a membership of 40,000 out of a possible 43,000 rural letter carriers of the nation. These are the most regular users of highways. These men recognize the deficiencies in the present highway system and in conducting their daily tasks are vitally concerned about general highway improvement. They must travel every day, rain or shine, through all seasons of the year, and without choice of route.

In delivering mail they traverse 1,270,000 miles of road daily and contact 30,000,000 rural Americans.

The rural letter carrier is much the same as the rural doctor. He brings to many of the persons in the far removed sections the conversation of the community. Like the doctor, he is one who exercises quite considerable influence in molding public opinion. It is necessary that he shall be familiar not only with the necessity of roads, but with the machinery and finance which are necessary to produce them.

The National Rural Letter Carriers' Association maintains a permanent committee on "Good Roads." Also, the Association's state and county groups each has its committee on good roads.

The National Rural Letter Carriers are kept posted by a very creditable weekly known as the "National Letter Carrier" published here in Washington.

From time to time discussions of road matters, including the addresses of A. R. B. A. representatives before conventions of the National Rural Letter Carriers' Association, have appeared in this paper.

The officers of the National Rural Letter Carriers Association desire to benefit by the information which the



A. R. B. A. can furnish. W. G. Armstrong, newly elected president of the N. R. L. C. A. has accepted an invitation to appear on the program of the A. R. B. A. Convention at St. Louis.

American Farm Bureau Federation.—The American Farm Bureau Federation is a national organization with executive agents functioning in more than one-half the counties of the United States. In each of these counties the matter of road improvement is an important function. The American Farm Bureau Federation has been eager to cooperate with our Association and is desirous that we shall supply them with definite information on road matters that their committees may operate on a firm basis. At the same time they are carrying on extensive work where now organized. They are also conducting a program of extension to the end that they shall organize in like manner county groups in the remaining counties of the United States as promptly as possible.

Mr. Norman Blaney has been named as Director of the Farm to Market Roads by the Bureau and is enthusiastic and progressive in promoting favorable opinion for highway development. He has prepared articles for national technical publications and from time to time has issued pamphlets dealing with the status of highway improvement, giving particular attention to the secondary roads.

The American Farm Bureau Federation issues a monthly publication, devoted to farm matters, including road improvement, which is subscribed to by more than three-quarters of a million farmers. Mr. Blaney will also speak at the St. Louis convention.

American Automobile Association.—The American Automobile Association is an aggressive leader on behalf of highway improvement. It is organized into more than 700 local clubs which represent more than a million motorists in every state of the country. They maintain executive offices for the general association at Washington and are influential in

respect to federal, state and local legislation.

Like other associations, the members of this group desire to hold taxes to a minimum unless fortified with facts to convince the membership of the necessity of increasing funds—the action of local associations might be prejudiced against increased taxes—which would fall upon the motorist.

Highway Financing

Century-old conditions and laws govern the administration of highway funds in some parts of the United States, according to the findings of the American Road Builders' Association committee on highway finance, of which T. H. Cutler, chief engineer, Missouri state highway commission, is chairman.

The continued study of highway financing is an important part of the Association's research activities, and the report this year will include a summary of methods of financing and administering highway funds in the 48 states.

While highway funds have steadily increased for some years past, and evidently will continue to do so, in some places there has been little simplification of administering bodies or methods.

Future highway development depends on sound financing and wise use of funds. All the financing methods in existence have the same objective—the economic construction, maintenance and operation of highways.

Complicated methods of fund allocation by states to smaller political subdivisions are misleading to the public. Highway funds are used in some instances for purposes other than highways. Counties have authorized bond issues to build state highways. The report will throw light on all these subjects. The nation's outstanding highway engineers, financiers and professors of highway engineering have contributed to the study through committee membership.

The highway finance report will be presented by Chairman Cutler as a valuable and interesting part of the 28th annual convention and road show of the American Road Builders' Association at St. Louis, Mo.

Highway Location Studies

Thousands of human lives sacrificed to modern motor traffic would have been saved if the highways had been properly located when they were built, in the opinion of R. Getty Browning, locating engineer of the North Carolina state highway department.

In his work as location committee chairman for the American Road Builders' Association, Browning will direct the work of eight groups of state highway engineers throughout the nation which are studying different phases of highway location.

Classification of highways with respect to their importance for local service, and for rapid transit to distant points, will be based to a large extent on the density and character of traffic the roads will carry, in the studies of one group.

Another sub-committee subject will be visibility and a study will be made of all available data and experience tending to show the minimum clear sight distance which should be provided on these different types of highways.

The subject of grade crossings is considered of vast importance, and the group studying them will attempt to point out which situations justify immediate expenditures for re-location or grade separation, since it is evident that all grade crossings cannot be removed because of the tremendous expense involved.

Another question to be studied will be the application of limited funds to road building where the alternatives are completion of high type paving with grade crossings, or separating the grades and using a cheaper type of paving.

The effect bridges and culverts have upon highway location is seen, for example, where a highway has been greatly lengthened in order to use an existing bridge, whereas it probably would have been much cheaper, considering through traffic, to have shortened the line and built a new bridge. The need of full width of roadway over small culverts to overcome the dangers of short span, narrow bridges with vertical headwalls, is pointed out.

The group studying spur roads will investigate the question as to whether main arteries of travel shall be diverted around a town or village or carried directly through the center. Spur roads might be constructed from main lines into the local centers of population, thus eliminating congestion, danger and delay to through traffic. Conditions

will be cited under which either method is to be preferred.

The fallacy of economizing on the grading of a highway to such extent that alignment, grades and visibility are unsatisfactory will guide the investigators of the distribution of construction costs. It is thought that if a road be located correctly, sufficient grading done to secure easy grades, good visibility and sufficient width to accommodate present and future traffic, the cost of this item of construction properly might be distributed through the life of the road, although the cost of paving and other items might be charged off within a reasonable term of years.

Data from automobile clubs, bus lines, trucking concerns and other motor agencies will assist a sub-committee in ascertaining the maximum length of maximum grades which might be permissible on different types of highways. Upon a proper solution of this question depends in a large degree the cost of construction of any given highway, particularly in hilly or mountain country. In view of the endeavor for greater vehicular speed and power, it is thought preferable to use the steepest allowable grade, if by so doing the visibility can be proportionately increased. Securing the best possible alignment is advisable, even though the grades must be increased somewhat.

Many questions have been met by the group studying highway curves, such as that of superelevation, and the formula for it; the widening and spiralling of short radius curves; maximum curves on different types of roads; reduction of grades on curves, under what circumstances and to what extent; the use of reverse curves where satisfactory vision can be secured.

All the facts brought out, and recommendations of these engineering authorities will be incorporated in the report on highway location to be presented by Chairman Browning at the American Road Builders' Association convention and road show in St. Louis, January 10-16, 1931. Motion pictures will show, by striking contrasts, the benefits of proper location. With the widespread interest in this subject, Browning's report is expected to be a highlight of a very comprehensive convention program. Research in the field of location is practically new, and the committee findings will be of great value to all highway engineers and ultimately to the public they serve.

Student Member Section Leads Others in Growth

The student membership section of the American Road Builders' Association, newly organized this year, already has a membership of 122 scattered through 19 universities. Missouri School of Mines leads with 27 students enrolled, and Worcester Polytechnic Institute has 25.

The association organized this section by a resolution which limited its student membership to 400, thus the original quota is more than one-fourth filled in the first few months of operation. The student members receive the engineering and research bulletins of the Association and the annual yearbook of convention proceedings.

It is hoped to organize student groups for attendance at the St. Louis Convention and Road Show, as the value of participation in that gathering would greatly supplement their studies of highway engineering.

To encourage a large number of students to go to St. Louis, special one-day excursions, with exceptionally low fares, are being organized from a number of universities, giving the students a full day at the Road Show.

The student scholarships of the Pan American Division this year have been awarded to Francisco Munos and Aquiles Serdin, of Mexico, and Rodolfo Zuniga, of Costa Rica. Munos is at present attached to the Association staff, Serdin is studying at Massachusetts Institute of Technology, and Zuniga is at Iowa State College.

There have been healthy membership gains in every other division of the association this year.

Motor Freight Exposition at Road Show

A motor freight exposition of all the equipment which has a part in the vast and growing motor freight transportation industry is announced in connection with the annual road show of the American Road Builders' Association in St. Louis, Jan. 10-16, 1931, by Charles M. Upham, association engineer-director.

Motor trucks, vans, refrigerator bodies, accessories, and the exhibits of motor freight operators will supplement a national gathering of motor freight men to discuss the problems of their rapidly expanding industry. The meeting will bring together for the first time on a large scale the builders and the commercial users of roads.

The 1931 Convention and Exposition of the American Road Builders Association



The Arena, St. Louis, Mo., Where the Convention and Exposition Will Be Held.

THE 28th annual convention of the American Road Builders Association, to be held at St. Louis, Jan. 12-16, meets under most auspicious circumstances. Highway building was one branch of the construction industry that did not show a falling off last year. On the contrary the volume of work showed a decided increase, and there is every indication that in 1931 an even larger construction program will be carried out. The convention will open with a general session on Monday morning, Jan. 12. At the same time the road show will be opened to delegates and visitors. On Monday afternoon the county highway officials division will open its sessions. The report of the committee on finance and administration also will be submitted and there also will be a combined session on traffic devices, steel forms and weighing devices. In the evening there will be a reception and smoker for delegates from outside the United States.

On Tuesday there will be a report of the committee on highway location, a motor freight session, contractors session, city officials session and county highway officials session. In the evening there will be the contractors' supper dance.

On Wednesday the following reports will be submitted: Committee on subgrades and pavement bases, committee on snow removal and

equipment, committee on grading methods and grading equipment, committee on standardization of methods of purchasing equipment, committee on a survey of needs for and availability of maintenance equipment and committee on grade crossings. There also will be sessions of the county highway officials division and the city officials division, and a business meeting of the manufacturers division of the American Road Builders Association. In the evening the American Road Builders Association will hold its annual banquet.

On Thursday there will be sessions of the Pan American delegates, the county highway officials, and the city officials. Reports also will be submitted on central and truck mixed concrete and on highway guard rail. In the evening there will be the International reception and ball.

The Detailed Program—The program showing the important fields covered by the sessions, follows:

Monday, January 12, 1931

GENERAL SESSION

Monday Morning, 10:30

Presiding—W. A. Van Duzer, president, American Road Builders' Association, and assistant chief engineer, Pennsylvania Department of Highways, Harrisburg, Pennsylvania.

Invocation.

Address—Thos. H. MacDonald, chief, Bureau of Public Roads, U. S. Depart-

ment of Agriculture, Washington, D. C.
Address—W. A. Van Duzer, president, American Road Builders' Association.

Monday Afternoon, 12:30

Luncheon—Board of Directors, Program Speakers and Committee Members, County Highway Officials' Division.

Monday Afternoon, 12:30

Luncheon—Chairmen of Equipment Committees.

COUNTY HIGHWAY OFFICIALS' SESSION

Monday Afternoon, 2:00

Presiding—L. O. Marden, vice-president, County Highway Officials' Division, American Road Builders' Association, and county engineer, Worcester County, Worcester, Mass.

Report of Committee on Legislation, Finance and Administration—"Financing Methods," Otto Hess, chairman, engineer-manager, Kent County Road Commission, Grand Rapids, Mich.

Report of Committee on Regional Surveys and Plans—"Financing and Planning Secondary Highway Systems," E. A. Griffith, chairman, chief engineer of roads, Allegheny County, Pittsburgh, Pa.

"Specific Examples of Progress" (5 or 10 minute talks).

"Allegheny County, Pennsylvania," E. A. Griffith, chief engineer of roads, Allegheny County, Pittsburgh, Pa.

"Morris County, New Jersey," Major George W. Farny, chairman, National County Roads Planning Commission, Morris Plains, N. J.

"St. Louis County, Missouri," Roy Jablonsky, county engineer, St. Louis County, St. Louis, Mo.

"County Administration in Iowa,"

J. C. McLean, county engineer, Woodbury County, Sioux City, Iowa.

"Better County Business Methods in Michigan," A. R. Bailey, county engineer, Washtenaw County, Ann Arbor, Mich.

"A Comprehensive Plan for State Support to Increase and Adequately Finance County Progress in Illinois," Duncan Campbell, assistant county highway superintendent, Cook County, Chicago, Ill.

B. C. McCurdy, county highway superintendent, St. Clair County, Belleville, Ill.

General Discussion.

SESSION ON HIGHWAY FINANCE AND ADMINISTRATION

Monday Afternoon, 2:00

Presiding—W. W. Mack, chief engineer, Delaware State Highway Department, Dover, Del.

Report of Committee on Highway Finance and Administration, T. H. Cutler, chairman, chief engineer, Missouri State Highway Department, Jefferson.

General Discussion.

COMBINED SESSION ON TRAFFIC DEVICES, STEEL FORMS AND WEIGHING DEVICES

Monday Afternoon, 2:00

Presiding—John D. Waldrop, state highway engineer, Raleigh, N. C.

Report of Committee on Traffic Devices and Their Application, Harry E. Neal, chairman, traffic engineer, Ohio Department of Highways, Columbus, Ohio.

General Discussion.

Report of Committee on Standardization of Steel Forms for Concrete Pavements, C. H. Buckius, chairman, construction engineer, Pennsylvania Department of Highways, Harrisburg, Pa.

General Discussion.

Report of Committee on Standardization of Weighing Devices for Concrete Aggregates, Paul M. Tebbs, chairman, assistant chief engineer, Pennsylvania Department of Highways, Harrisburg, Pa.

General Discussion.

Monday Afternoon, 4:30

Meeting, Pan American Delegates.

Monday Evening, 8:00

Road Builders' Smoker in honor of International Delegates.

Tuesday, January 13, 1931

SESSION ON HIGHWAY LOCATION

Tuesday Morning, 10:00

Presiding—Henry H. Blood, chairman, State Roads Commission, president, American Association of State Highway Officials, Salt Lake City, Utah.

Report of Committee on Highway Location, R. Getty Browning, chairman, principal locating engineer, North Carolina State Highway Commission, Raleigh, N. C.

- 1—Classification of Highways—Right of Way.
- 2—Visibility.
- 3—Grade Crossings.
- 4—Bridge and Culverts.
- 5—Spur Roads.
- 6—Distribution of Construction Costs.
- 7—Allowable Gradients for Highways.

8—Highway Curves.
General Discussion.

SESSION ON AIRPORT DRAINAGE AND SURFACING

Tuesday Morning, 10:00

Presiding—Harry H. Blee, director of aeronautic development, U. S. Department of Commerce, Washington, D. C.; and chairman, Committee on Airport Drainage and Surfacing.

Resume of Problems Facing Committee on Airport Drainage and Surfacing presented by Fred A. Schnepfe, special research engineer, Washington, D. C.

"Grading, from the Standpoint of Surface Drainage and Lighting," William N. Carey, city engineer, St. Paul, Minn.

"Disposal of Surface Water—Separate Storm Water System or Combination Storm Water and Sub-drainage System," William A. Hemphill, airport engineer, Day & Zimmerman, Philadelphia, Pa.

"Intercepting Drains," H. E. Cotton, municipal engineer, Armco Culvert Manufacturers Association, Middletown, Ohio.

"Impact of Landing Planes," A. T. Goldbeck, director, Bureau of Engineering, National Crushed Stone Association, Washington, D. C.

"Runway Transition Strips," William F. Centner, superintendent, Port Columbus, Columbus, Ohio.

"Surface Textures Suitable for the Various Types of Hard Surface Runways," William J. Wallace, engineer-manager, Detroit City Airport, Detroit, Mich.

General Discussion.

SESSION ON MOTOR FREIGHT

Tuesday Morning, 10:00

Presiding—J. N. Galvin, president of the Penoyer Merchants Dispatch, Chicago, Ill.

"Equitable Truck Taxation," T. R. Dahl, secretary, The White Company, Cleveland, Ohio.

"Shall It Be Interstate Commerce Control?" J. W. Blood, secretary and general counsel, Southern Kansas Stage Lines Co., Wichita, Kan.

"State Control, or Contract Haulers," Sterling G. McNees, Harrisburg, Pa.

"Economic Merchandise Distribution by Truck," Norman Halliday, vice-president, Mack Motor Truck Company, Allentown, Pa.

"The Universal Tariff," Lewis A. Monroe, Los Angeles, Calif.

"Economics of Trucking and Trucking Costs," L. A. Graham, Relay Motors Company, Lima, Ohio.

General Discussion.

Meeting, Motor Freight Operators, for Organization of Motor Freight Division.

CONTRACTORS' SESSION

Tuesday Morning, 10:00

Presiding—William R. Smith, president, Lane Construction Corporation, Meriden, Conn.

"Relation Between Increased Highway Expenditures and Employment,"—a symposium.

1—Federal and State Activities, W. R. Markham, executive secretary, American Association of State Highway Officials, Washington, D. C.

2—County Activities, Stanley Abel, President, County Highway Officials' Division, American Road Builders' Association; and supervisor, Fourth District, Kern County, Taft, Calif.

3—City Activities, C. E. Myers, president, City Officials' Division, American Road Builders' Association; and director of transit, Philadelphia, Pa.

General Discussion.
"Effect of State Aid to Counties," Jacob L. Bauer, state highway engineer, Trenton, N. J.

General Discussion.
"Is Prison Labor Economical?" Woolsey Finnell, highway director, Alabama Highway Department, Montgomery, Ala.

General Discussion.
"Highway Maintenance by Contract," Harry J. Kirk, assistant manager, Engineering Construction Divisions, Associated General Contractors of America, Washington, D. C.

General Discussion.

CITY OFFICIALS' SESSION

Tuesday Afternoon, 2:00

Presiding—Colonel C. E. Myers, president, City Officials' Division, American Road Builders' Association; and Director of Transit, Philadelphia, Pa.

"Methods of Raising Money for City Paving Work," W. A. Hardenbergh, vice-president and associate editor, Public Works, New York.

General Discussion.

Report of Committee on Organization, Administration and Finance, Captain H. C. Whitehurst, chairman, engineer of highways, District of Columbia, Washington, D. C.

General Discussion.

Report of Committee on Design and Construction, George B. Sowers, chairman, commissioner, Division of Engineering and Construction, Cleveland, Ohio.

General Discussion.

COUNTY HIGHWAY OFFICIALS' SESSION

Tuesday Afternoon, 2:00

Presiding—Stanley Abel, president, County Highway Officials' Division, American Road Builders' Association; and Supervisor, Fourth District, Kern County, Taft, Calif.; also chairman, Committee on Public Relations.

Report of Committee on Public Relations, "Building Public Opinion for Secondary Highway Improvement," Major Roy Britton, president, Automobile Club of Missouri, St. Louis, Mo.

Norman M. Blaney, director, Farm to Market Roads, American Farm Bureau Federation, Chicago, Ill.

W. G. Armstrong, president, National Rural Letter Carriers' Association, Niles, Michigan.

L. J. Rothgery, field extension engineer, Michigan State College, East Lansing, Michigan.

General Discussion.

"How to Use Publicity for County Highway Progress," Victor Brown, associate editor, "Roads and Streets," Chicago, Ill.

General Discussion.

"Why County Officials in Every State Should Organize," H. G. Culverhouse, president, Association of County Commissioners, Birmingham, Ala.

C. T. Charnock, secretary, County Commissioners Association, Sioux Falls, S. D.

Don Heaton, president, County Surveyors and County Engineers Association, Fowler, Ind.

J. W. Mavity, president, County Engineers Association, Newton, Kan.
General Discussion.

SESSION ON CONSTRUCTION AND MAINTENANCE METHODS FOR LOW COST ROADS AND BRIDGES

Tuesday Afternoon 2:00

Presiding—A. H. Hinkle, superintendent of maintenance, Indiana State Highway Commission, Indianapolis, Ind.

"Construction and Maintenance Methods for Low Cost Roads and Bridges," C. N. Conner, engineer-executive, American Road Builders' Association, Washington, D. C.
General Discussion.

CONTRACTORS' SESSION

Tuesday Afternoon, 2:00

Presiding—A. E. Horst, president, Associated General Contractors of America, Washington, D. C., and secretary-treasurer, Henry W. Horst Co., Philadelphia, Pa.

"What Is the Future of Highway Contracting?"—a symposium.

"As Viewed by a State Highway Official," A. R. Losh, chief engineer, State Highway Commission, Oklahoma City, Okla.

"As Viewed by an Official of the Associated General Contractors of America," Alan J. Parrish, general contractor, Paris, Ill.

"As Viewed by a Surety Company Official," Richard Deming, vice-president, American Surety Company, New York City.

"As Viewed by a Banking Official," Dr. W. F. Gephart, vice-president, First National Bank, St. Louis, Mo.
General Discussion.

"The Bureau of Contract Information and Its Specific Functions," S. M. Williams, president, Bureau of Contract Information, Washington, D. C.
General Discussion.

Tuesday Evening, 9:30

Contractors' Supper Dance.

Wednesday, January 14, 1931

SESSION ON SUBGRADES AND PAVEMENT BASES

Wednesday Morning, 10:00

Presiding—A. T. Goldbeck, director, Bureau of Engineering, National Crushed Stone Association, Washington, D. C., and chairman, Committee on Subgrades and Pavement Bases.

Report of Committee on Subgrades and Pavement Bases, presented by James S. Burch, Jr., special investigator, assistant engineer, American Road Builders' Association, Washington, D. C.

General Discussion.

SESSION ON SNOW REMOVAL AND EQUIPMENT

Wednesday Morning, 10:00

Presiding—Samuel Eckels, chief engineer, Pennsylvania Department of Highways, Harrisburg, Pennsylvania.

Report of Committee on Snow Removal and Equipment, W. F. Rosenwald, chairman, maintenance engineer, Minnesota Department of Highways, St. Paul, Minn.

General Discussion.

SESSION ON GRADING METHODS AND EQUIPMENT

Wednesday Morning, 10:00

Presiding—B. E. Gray, former state

maintenance engineer, West Virginia State Highway Commission.

Report of Committee on Grading Methods and Grading Equipment, H. J. Spelman, chairman, chief engineer, State Road Commission of West Virginia, Charlestown, W. V.

Discussion by J. A. Williams, division construction engineer, New Jersey State Highway Commission, Camden, N. J.

General Discussion.

SESSION ON STANDARDIZATION OF METHODS OF PURCHASING EQUIPMENT

Wednesday Morning, 10:00

Presiding—M. DeGlopper, materials and equipment engineer, State Highway Department, Lansing, Mich.

Report of Committee on Standardization of Methods of Purchasing Equipment, W. T. Chevalier, chairman, publicity director, "Engineering News-Record," New York City.

General Discussion.

SESSION OF MAINTENANCE EQUIPMENT

Wednesday Afternoon, 2:00

Presiding—C. P. Owens, maintenance engineer, Missouri State Highway Department, Jefferson City, Mo.

Report of Committee on a Survey of Needs for and Availability of Maintenance Equipment, R. D. Cochran, chairman, state highway engineer, Lincoln, Nebr.

General Discussion.

SESSION OF GRADE CROSSINGS

Wednesday Afternoon, 2:00

Presiding—E. W. James, chief, Division of Transportation, Bureau of Public Roads, U. S. Department of Agriculture, Washington, D. C.

Report of Committee on Grade Crossings, R. H. Baker, chairman, commissioner, Tennessee Department of Highways and Public Works, Nashville, Tenn.

General Discussion.

COUNTY HIGHWAY OFFICIALS' SESSION

Wednesday Afternoon, 2:00

Presiding—W. O. Washington, vice-president, County Highway Officials' Division, American Road Builders' Association; and county engineer, Cameron County, Brownsville, Texas.

Report of Committee on Design and Construction, "Low Cost Roads and Bridges," C. E. Burleson, chairman, county engineer, Pinellas County, Clearwater, Fla.

"Low Cost Roads in Champaign County, Illinois," Forest Fisher, county superintendent of highways, Champaign County, Urbana, Ill.

General Discussion.

Report of Committee on Maintenance, "Maintenance of Traffic Bound Roads," H. G. Sours, chairman, county engineer, Summit County, Akron, Ohio.

"Widening and Reconstructing," H. G. Sours, chairman, county engineer, Summit County, Akron, Ohio.

"Administration of Maintenance in Woodbury County, Iowa," I. C. McLean, county engineer, Woodbury County, Sioux City, Iowa.

"Administration of Maintenance in Ionia County, Michigan," A. M. Williams, county engineer, Ionia County, Ionia, Mich.

"The Value of Welding in Maintenance of Short Span Steel Bridges,"

C. B. Dannenburg, bridge engineer, New Castle County, Wilmington, Del.
General Discussion.

CITY OFFICIALS' SESSION

Wednesday Afternoon, 2:00

Presiding—C. E. Myers, president, City Officials' Division, American Road Builders' Association; and director of transit, Philadelphia, Pa.

"New Development in City Paving Work," John M. Tipper, city engineer, Des Moines, Iowa; William B. Fowler, city engineer, Memphis, Tenn.

General Discussion.

Report of Committee on Maintenance, Albert T. Rhodes, chairman, superintendent of streets and sewers, Leominster, Mass.

General Discussion.

Report of Committee on Traffic, M. O. Eldridge, chairman, assistant director of traffic, Washington, D. C.

General Discussion.

Wednesday Evening, 7:30

Annual Road Builders' banquet.

Thursday, January 15, 1931

PAN AMERICAN SESSION

Thursday Morning, 10:00

Presiding—M. A. Corrales, president, Pan American Division, American Road Builders' Association; and chief engineer of roads and bridges, Havana, Cuba.

"Coordinated Economical Function of Highways and Railroads," Javier Sanchez Mejorada, president, National Railways of Mexico, Mexico City, Mexico.

"Discussion and Extension of the English-Spanish Technical Vocabulary of Highway Terminology as Presented at the 27th Annual Convention," M. A. Corrales, chief engineer of roads and bridges, Havana, Cuba.

Discussion by Juan Agustin Valle, Buenos Aires, Argentina.

Presentation of Conclusions and Recommendations, translated into Spanish, from committee reports.

"Construction of Central Highway of Cuba"—(Films will be shown in connection with this report.) M. A. Corrales, chief engineer, roads and bridges, Havana, Cuba.

"Results and Possibilities of the Scholarship Plan of the American Road Builders' Association," Jose Rivera R., Mexico, D. F.

"Low Cost Road Construction as Applied to Latin American Countries."

"Highway Conditions in Argentina," Juan Augustin Valle, Buenos Aires, Argentina.

"Advancement of Central American Highway Programs."

Business meeting, Pan American Division, American Road Builders' Association.

SESSION ON CENTRAL AND TRUCK MIXED CONCRETE

Thursday Morning, 10:00

Presiding—H. F. Thomson, vice-president, General Material Company, St. Louis, Mo.

Report of Committee on Central and Truck Mixed Concrete, Colonel R. Keith Compton, chairman, director, Department of Public Works, Richmond, Va.

General Discussion.

SESSION ON HIGHWAY GUARD RAIL

Thursday Morning, 10:00

Presiding—H. G. Shirley, state highway commissioner, Richmond, Va.
Report of Committee on Highway Guard Rail, R. M. Reindollar, chairman, assistant chief engineer, Maryland Roads Commission, Baltimore, Md.
General Discussion.

Thursday Afternoon, 12:30

Luncheon meeting, board of directors, American Road Builders' Association.

COUNTY HIGHWAY OFFICIALS' SESSION

Thursday Afternoon, 2:00

Presiding—Otto Hess, engineer-manager, Kent County Road Commission, Grand Rapids, Mich.
Review of reports and discussions of entire conference, to endorse specific recommendations or conclusions.
Discussion of program for 1931.
Business meeting, County Highway Officials' Division.
Meeting, board of directors, County Highway Officials' Division.

CITY OFFICIALS' SESSION

Thursday Afternoon, 2:00

Presiding—C. E. Myers, president, City Officials Division, American Road Builders' Association; and director of transit, Philadelphia, Pa.
Review of reports and discussions of entire conference, to endorse specific recommendations or conclusions.
Discussion of program for 1931.
Business meeting, City Officials' Division.
Meeting, board of directors, City Officials' Division.

Thursday Afternoon, 2:00

Meeting of Cooperating Committees of American Association of State Highway Officials and American Road Builders' Association.

Cooperating Committee, American Association of State Highway Officials: Fred R. White, chairman, chief engineer, Iowa State Highway Commission, Ames, Iowa.

Cooperating Committee, American Road Builders' Association, W. A. Van Duzer, chairman, assistant chief engineer, Pennsylvania Department of Highways, Harrisburg, Pa.; president, American Road Builders' Association.

Thursday Afternoon, 4:30

Business meeting, American Road Builders' Association.

Thursday Evening, 9:00

International reception and ball.

Exhibitors at the Road Show

Early in December all available space had been claimed by manufacturers. Exhibitors who applied later had to take such space as could be arranged for them. The number of exhibitors is practically the same as last year at Atlantic City. The exhibit, however, is more diversified and many new developments have entered the field. A new exhibit this year will be a display of motor freight equipment. The following is a list of the exhibitors who have

obtained space up to the time of our going to press.

J. D. Adams Company
Aeroil Burner Company
Allis-Chalmers Mfg. Co.
Aluminum Company of America
American Bitumuls Company
American Bosch Magneto Corporation
American Cable Company, Inc.
American Casting Company
The American City
American Gas Accumulator Co.
American Steel & Wire Co.
American Tar Products Co., Inc.
American Tractor Equipment Co.
American Vibrolithic Corporation
Amiesite Asphalt Co. of America
Anthony Company, Inc.
Armco Culvert Manufacturers Assn.
Asphalt Institute, The
Athey Truss Wheel Co.
Austin Mfg. Co.
Austin-Western Road Machinery Co.
Autocar Company, The
Automatic Signal Corporation

Baker Mfg. Co., The
Baldwin Tool Works
Barber Asphalt Co.
Barber-Greene Co.
Barrett Co., The
Jas. B. Berry's Sons Co.
Black & Decker Mfg. Co.
Blaw-Knox Co.
Bonney-Floyd Co., The
Robert Bosch Magneto Company
Bragg Kliersrath Corp.
Briggs & Stratton Corp.
Brockway Indiana Trucks, Inc.
Broderick & Bascom Rope Co.
Brookville Locomotive Co.
Brown-Lipe Gear Co.
Buckeye Traction Ditcher Co.
The Buda Co.
Buffalo-Springfield Roller Co.
The Buhl Co.
Bunting Brass and Bronze Co.
The Burch Corporation
Butler Bin Co.
Byers Excavator Co., The

Philip Carey Co., The
J. I. Case Co.
Caterpillar Tractor Co.
Central Iron & Steel Co.
Chevrolet Motor Co.
Chicago Pneumatic Tool Co.
Cities Equipment Corp.
Cleaver Co., Inc., J. C.
Cleveland Pneumatic Tool Co.
Cleveland Tractor Company, The
Clinton Motors Corp.
Collins & Co., Thos. E.
Colprovia Roads, Inc.
Columbia Products Co.
Commercial Credit Companies
Concrete Surfacing Machinery Co.
Consolidated Iron-Steel Mfg. Co.
Continental Motors Corp.
Contractors and Engineers Monthly
Cummer & Son Co., The F. D.
Cummins Engine Co.
Curtis Pneumatic Machy. Co.
Cyclone Fence Co.

D-A Lubricant Co., Inc.
Davey Compressor Co.
Dayton Steel Foundry Co., The
Diamond Iron Works, Inc.
Dodge Brothers Corp.
The Dow Chemical Co.
Dukelow Hardpan Plow Co.

Eaton Axle & Spring Co.
Eisemann Magneto Corp.
Electric Wheel Co.
Equipment Corporation of America
Etnyre & Co., Inc., E. D.
Euclid Crane & Hoist Co.

Everhot Mfg. Co.
Fafnir Bearing Co., The
J. D. Farasey Mfg. Co., The
Federal Motor Truck Co.
Ferguson Publishing Co.
Flintkote Roads, Inc.
Foote Bros. Gear & Machine Co.
Ford Motor Co.
Four Wheel Drive Sales Co.
French Co., A. W.
Fuller Co.
Fuller & Johnson Mfg. Co.
Fuller & Sons Mfg. Co.

Galion Allsteel Body Co., The
Galion Iron Works & Mfg. Co., The
Gardner-Denver Company
Gears & Forgings, Inc.
General Motors Truck Co.
General Wheelbarrow Company
Geneva Metal Wheel Co., The
Gilbert Manufacturing Co.
Gilson Bros. Company
Godwin Co., Inc., W. S.
Good Roads
Good Roads Machinery Co., Inc., The
Goroco Mechanical Spreader Co.
Gurley, W. & L. E.

Haiss Mfg. Co., Inc., Geo.
Hamilton Manufacturing Co.
Harley Davidson Motor Co.
Hastings Pavement Co., The
Hayward Company, The
Hazard Wire Rope Co.
Headley Emulsified Products Co.
Heil Co., The
Heltzel Steel Form and Iron Co.
Hercules Company, The
Hercules Motors Corp.
Hercules Products, Inc.
Highland Body Mfg. Co.
Highway Engineer & Contractor
Highway Service, Inc.
Highway Trailer Co.
Hotchkiss Steel Products Co., Inc.
Huber Mfg. Co., The
Hug Company, The
Hughes-Keenan Co., The
Humboldt Mfg. Co.
Hvass & Co., Inc., Chas.
Hyatt Roller Bearing Co.

Independent Pneumatic Tool Co.
Ingersoll-Rand Company
International Cement Corp.
International Engineer
International Harvester Co. of America
International Motor Co.
International Nickel Company, Inc., The

Interstate Amiesite Company
Iowa Manufacturing Co.
Irving Iron Works Company

Johns-Manville Corp.
Johnson Co., C. S.
Joy Manufacturing Company
Keystone Driller Co.
Killefer Mfg. Corp.
Kinney Manufacturing Co.
Kohler Co.

LaBour Company, Inc.
Lakewood Engineering Co., The
La Plant-Choate Mfg. Co., Inc.
Lee Transit Mixer Co.
LeRoi Co.
Leschen & Sons Rope Co., A.
Linn Mfg. Corp., The
Littleford Bros.
Louisville Frog, Switch & Signal Co.
Lufkin Rule Co.

McEverlast, Inc.
McGraw-Hill Publishing Co.
Macasphalt Corp. of America
Macleod Company
Malleable Iron Fittings Co.
Manufacturers Record

Meadows, Inc., W. R.
Metal Forms Corporation
Metalweld, Inc.
Michigan Power Shovel Co.
Midwest Locomotive Works
Minneapolis-Moline Power Implement Co.

Missouri Portland Cement Co.
Mohawk Asphalt Heater Co.
Monroe & Sons, N. S.
Moon Track Co.
Moritz-Bennett Corporation
Morse Chain Co.
Motor Improvements, Inc.

National Brake & Electric Co.
National Carbide Sales Corp.
National Colortype Co., The
National Paving Brick Mfrs. Assn.
National Steel Fabric Company
National Traffic Guard Co.
National Traffic Signal Co.
Nelson Iron Works, Inc., N. P.
New Departure Mfg. Co., The
Niess and Company, Inc.
Norma-Hoffmann Bearings Corp.
Ohio Locomotive Crane Co.
Olsen Testing Machine Co., Tinius
Owen Bucket Co., The
Page Steel & Wire Co.
Pels & Company, Inc., Henry
Perfection Steel Body Co.
Perfex Corporation
Pioneer Gravel Equipment Mfg. Co.
Pit and Quarry
Pneu-Hydro Road Machinery Co.
Portland Cement Assn.
Portland Concrete Machines Co.
Prest-o-Lite Company, Inc.
Public Works (Journal)

Rawls Manufacturing Co.
Ray-Signs Corp.
Relay Motors Corp.

Reo Motor Car Company
Riddell Company, W. A.
Rightway Corporation, The
Roads and Streets
Rogers Brothers Corporation
Roller Bearing Co. of America
Rome Mfg. Co.
Russell Mfg. Co.
Ryan Mfg. Corp.

Sauerman Bros., Inc.
Sawyer-Massey, Limited
Schramm, Inc.
Service Bureau, America Wood-Pre-servers' Assn.
Servicised Premoulded Products, Inc.
Shaw-Enochs Tractor Co.
Shell Petroleum Corp.
Shunk Mfg. Co.
Simmons Hardware Company
Sinclair Refining Co.
Sivyer Steel Casting Co.
Skelton Shovel Works
S K F Industries, Inc.
Snap-On Tools, Inc.
Solvay Sales Corp.
South Bend Lathe Works
S. P. A. Truck Corp.
Splittorf Electrical Co.
Standard Oil Company of N. J.
Standard Oil Company of N. Y.
Sterling Machinery Corp.
Stover Mfg. & Engine Co.
St. Paul Hydraulic Hoist Co.
Streich & Bro. Co., A.
Stroud Road Machinery Co.
Sullivan Machinery Co.
Superior Body Corp.
Texas Company, The
Timken-Detroit Axle Company, The
Timken Roller Bearing Co.
Titeflex Metal Hose Co.
Toledo Pressed Steel Co., The

Toncan Culvert Mfrs.' Assn.
Trackson Co.
Transit Mixers, Inc.
Trucktor Corp., The
Truscon Steel Co.
Twin Disc Clutch Co.

Union Steel Products Co.
Universal Bearing Metals Corp.
Universal Crusher Co.
Universal Power Shovel Co.
U. S. Oil Company

Vellumoid Company, The

Wallace & Tiernan Products, Inc.
Walter Motor Truck Co.
Waukesha Motor Company
Wausau Iron Works
Wehr Company
Welsbach Traffic Signal Company
West Process Pavement Co., Inc.
Western Metal Specialty Co.
Western Wheel Scraper Co.
Westinghouse & Electric Mfg. Co.
White Company, The
Wiard Plow Co.
Wickwire Spencer Steel Co.
Wico Electric Company
Willett Mfg. Co.
Williams Co., G. H.
Williams Patent Crusher & Pulverizer Co.
Winsor Co., The
Wisconsin Motor Co.
Wood Hydraulic Hoist & Body Co.
Wood & Co., L. C.
Wood Preserving Corp., The
Wyoming Shovel Works

York Modern Corporation
Young Radiator Co.
Zenith-Detroit Corporation

California Has Lowest Fee

That California has the lowest automobile license fee of any state in the Union came to light in an analysis of Bureau of Public Roads figures prepared and released by the automobile finance division of Pacific Finance Corp., Los Angeles, Calif. Although standing second only to New York in total auto registrations, with 1,974,341 motor cars and trucks, California in 1929 was eleventh among states in fees collected on these vehicles with a cash total of \$10,489,068, it was revealed.

The average amount collected for each vehicle in California was \$5.31, the lowest of any state, in contrast to \$28.41 for Oregon, \$25.15 for Vermont, \$24.34 for Connecticut, \$20.65 for New Hampshire, \$18.62 for Delaware and \$18.06 for Arkansas among the highest, it was known. California's regular passenger-car rate is \$3, but the difference was made up by commercial vehicles and double charges for delinquent registrations.

States whose fees fell under \$10 per vehicle were Colorado, \$6.04; Arizona, \$6.86; Indiana, \$7.21; Ohio, \$7.22; Utah, \$7.44; Massachusetts, \$8.70; Nevada, \$9.30; New Mexico, \$9.63; and Kansas, \$9.80.

Leading California in total fees were New York, with \$38,393,313 collected for 2,263,259 vehicles, or \$16.91 each; Pennsylvania, \$29,264,695 for 1,733,283, or a \$16.88 average; Michigan, \$23,212,316 for 1,395,102, or \$16.64; Texas, \$20,418,696 for 1,348,107, or \$15.14; Illinois, \$17,087,209 for 1,615,088, or \$10.06; New Jersey, \$14,803,016 for 832,332, or \$17.78; Ohio, \$12,860,-

453 for 1,766,614, or \$7.22; Iowa, \$11,919,350 for 784,450 or \$15.19; Wisconsin, \$11,780,703 for 793,502, or \$14.84, and Minnesota, \$10,346,826 in fees for 730,399 automobiles, or a \$6.64 average.

Southwest Road Show and School

February 24, 25, 26 and 27, 1931, are the dates for the sixth annual Southwest Road Show and School, to be staged at Wichita, Kan., F. G. Wieland, manager, has announced.

The educational program will be arranged under the supervision of the Kansas State Highway Commission and the Kansas State Agricultural College in cooperation with the highway commissions of the southwest states, the U. S. Bureau of Public Roads and various colleges and universities.

This educational feature has attracted the attention of the entire southwest to the extent that nine states surrounding the show and school, not including the colleges and universities, had exhibits at the last school and required more than 16,000 sq. ft. of space to take care of the educational exhibits alone. At this early date, many have signified their intention of exhibiting at the 1931 exposition.

Additional floor space has been added to take care of the machinery, equipment, accessories and material exhibits, which last year taxed the exhibit space to its limit. Mr. Wieland anticipates that the interested attendance will exceed 25,000 at this exposition, as it has had an exceptionally steady and rapid growth.

Equipment and Materials on Display at the 1931 Road Show

IN the following pages, **ROADS AND STREETS** presents its annual pre-view of Road Show exhibits. The Road Show visitor and the stay-at-home alike will find a study of this array of 1931 road construction and maintenance equipment and materials profitable. All of the exhibits are described upon which information was available up to the time of going to press; a list of exhibitors will be found elsewhere in this issue.

J. D. Adams to Show New Grader

The J. D. Adams Co., Indianapolis, Ind., display will hold unusual interest this year in that a new type of Adams leaning wheel grader will make its first public appearance at the show. The company will also show the Adams elevating grader, which introduces several new features, including a shaft and gear driven carrier and the use of anti-friction bearings throughout. Adams motor graders will also be displayed. The exhibit will be located just inside the entrance of exhibition building A, which adjoins the arena on the east.

The new machine features increased capacity, greater strength and a wide range of blade adjustments. The blade can be swung outward to cut a 60 deg. slope on a bank with the wheels on the level; under many working conditions which permit putting the wheels part way up the bank, the slope can be made still steeper, if desired.

The standard 12 ft. blade can be extended horizontally beyond the line

of wheels approximately 6 ft. and the 14 ft. blade approximately 8 ft., which reaches can be extended an additional 3 ft. by the addition of a standard moldboard extension.

A front tilting adjustment on the semicircle permits a wide range of pitch adjustments—very sharp plowing positions can be obtained so that the blade will easily enter the hardest kind of ground. This is an easy working enclosed worm and gear control operated from the platform and the adjustment can be changed while the grader is in operation.

The frame consists of two heavy ship channels which are cross connected by five large tubular members securely welded to the frame beams. The front truck is connected to the grader by a large machine-finished steel ball and socket joint. The drawbar is of heavy H-beams and connects just above the draft ball by a universal eye connection. A heavy semicircle which gives wide support to the moldboard, is closely fitted to the reversing circle and both are of very strong all-welded construction. Every gear on the machine is enclosed. The gears are machine cut from forged steel blanks and the worms from semi-steel blanks; all worms are fitted with Timken roller bearings for end thrust, which makes all of the controls operate very easily. All connections in the blade and scarifier controls, blade side-shift and semicircle tilting adjustments, are machine-finished ball-and-socket type, Alemite lubricated and fully adjustable for wear. All lift links and other connecting links are drop-forged steel. All connections to the moldboard are ball and socket—an

exclusive feature on Adams graders.

The controls are few and simple, and feature a centrally located 3 in 1 control, by means of which one crank is used to make three different major adjustments, through the use of a simple set of enclosed transmission gears.

This new type of grader is now offered in two sizes—the No. 121 with 12 or 14 ft. blade and the No. 22 with 8, 9 or 10 ft. blade. Either grade is offered with or without scarifier. Timken roller bearings are used in the wheels.

Aeroil to Show New Power Spray Outfit

The Aeroil Burner Co., Inc., West New York, N. J., will exhibit a new power spray outfit for spraying emulsions for curing concrete roads. Other features of the exhibit, which will be in booth B-118, include:



New Power Spray Outfit

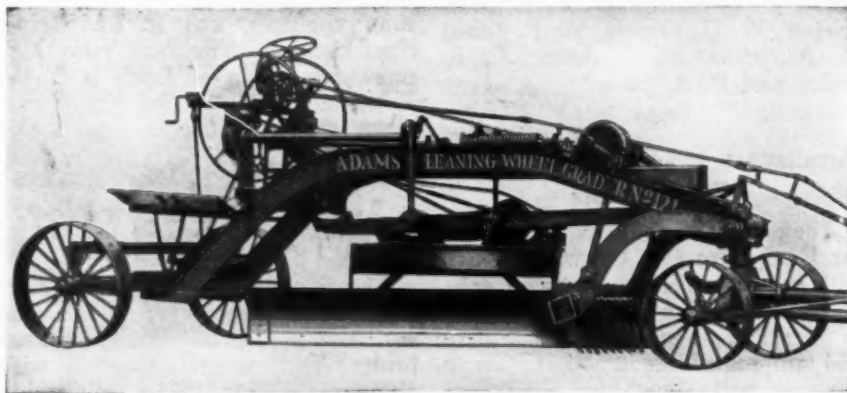
Asphalt kettles, oil-burning, asphalt and emulsion sprayers, paving tool heaters, concrete heaters, pouring pots—joint fillers, portable tool boxes, kerosene burners for road oil distributors.

The following will represent the company at the Road Show: George P. Kittel, president; Herbert M. Orschel, general field sales manager; Robert S. Arthur, Chicago branch manager.

Amiesite Exhibit

The Amiesite Asphalt Co., of America, Philadelphia, Pa., will occupy booth A-47. Those attending the show will be: D. M. Hepburn, president; G. K. Preston, secretary; J. N. Emory, engineer; Wm. Halton, president, Halton Amiesite Co., Mt. Vernon, N. Y.; Geo. B. Carey, president, Southern Amiesite Co., Lexington, Ky.; W. H. Hall, president, W. H. Hall Construction Co., Hartford, Conn.

The exhibit will consist of nu-

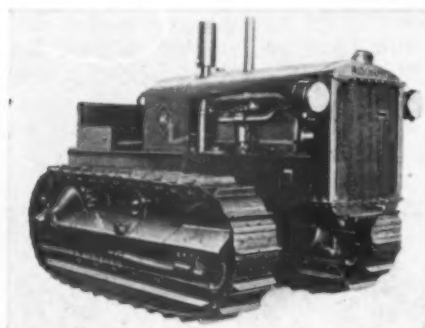


New Adams Leaning Wheel Grader

merous photographs of Amiesite pavement, moving pictures of the pavement showing various stages of construction, etc., and samples of the material.

Allis-Chalmers to Show Tractors

The Allis-Chalmers Manufacturing Co., through its Monarch Tractors Division, Springfield, Ill. will exhibit the following tractors: Three model U Industrial tractors—a narrow tread, a pneumatic tire equipped



Standard Model 35 Track-Type Tractor

and a solid tire equipped machine. One Monarch 75. One model 50 and one standard model 35, with the possibility that one wide tread model 35 may also be displayed.

American Bitumuls to Have Miniature Tank Truck in Operation

American Bitumuls Co., St. Louis, Mo., exhibit will consist of a decorated booth containing a sample display of its products and a miniature tank truck in operation to demonstrate the ready handling of bitumuls at cold temperatures and its ability to thoroughly coat stone. There also will be a motion picture machine and reels showing actual construction work done with bitumul's products.

New Highway Protection by American Wire Fence Co.

The accompanying illustration shows a type of buffer or deflector, adapted to installations of wire-mesh road guard, in service on a Florida highway. This product is manufactured by the American Wire Fence Co., manufacturers of Chain Link road guard. It consists of an 18-gauge galvanized strip, 8 in. wide, attached to the mesh by a special fastening device without nailing or contact with the posts. Elongated slots are used, allowing freedom of



Installation of Deflecting Plate on a Florida Highway

movement when the strip is struck. High visibility gives added protective value to an installation of this kind. A model of this guard will be on exhibit in space A-83 at the Road Show.

American Cable to Feature Bridge Cable

The American Cable Co., New York, N. Y., space B-9, will feature cable as applied to road work and a special picture exhibit of bridge cable—especially the three big bridges for which this company in conjunction with the Page Steel & Wire Co. has furnished the cables.

American Steel and Wire Products

The American Steel & Wire Co., Chicago, Ill., will occupy space A-73 at the Road Show. They will exhibit wire reinforcing fabric, triangle mesh and electric weld for the reinforcing of roads and streets, steel posts for highway signs, snow fences and woven wire fences, American wire rope for highway machinery and Perfected guard-rail for highway protection.

In attendance will be the following: B. S. Pease, O. T. Allen, P. T. Coons, D. E. Hinman, E. J. McCarthy, H. E. McCann, J. J. Reagan, H. D. Worthington, R. C. Groesbeck, E. B. Slason, W. H. Kremer, F. B. Kane, O. S. Moessmer, F. J. Oestreicher, W. H. Cordes, W. E. Ivins, H. A. Jones, M. E. Jones, C. F. Wiley and R. S. Green.

American Tractor Equipment Co. Exhibit

The exhibit of the American Tractor Equipment Co., Oakland, Calif., will consist chiefly of photographs and moving pictures of its entire line of dirtmovers, bulldozers, scarifiers and tamping rollers in action. These pictures will show the equipment taking the curves out of the Ridge Route in Southern California, land-

scaping around the Pacific Museum in San Francisco, working in the oil fields, grading a road through Oregon forests, heightening a water storage dam for the City of Los Angeles, building a mountain road, levelling a small lot to make way for a skating rink, etc.

American Tar Products Co. Exhibit

American Tar Products Co., Pittsburgh, Pa., has a booth in Building "A." Space will be provided for a comfortable lounge where Tarmac salesmen may receive their friends and customers attending the road show. Literature and information on Tarmac roads will be available. The booth will be in charge of P. L. Griffiths, vice-president, and S. H. Scott, manager, Tarmac Department.

Vibrolithic Processes Will Be Demonstrated

The American Vibrolithic Corp., Des Moines, Iowa, will exhibit in booth A-96. The exhibit will consist of a compacting machine, weighing about 350 lb., and occupying about 6 cu. ft. of space, and some short sections of force-transmitting units ordinarily used in connection with Vibrolithic processes. Besides this, there will be booklets, pamphlets, specifications, etc. There will also be photographs, probably some of them lighted transparent photographic prints, and possibly portable motion picture projectors showing the actual field work. All of these, of course, will relate to the construction of compacted concrete and interlocking bituminous pavements.

J. E. White will be in charge of the booth, and at most other times there will be in attendance and available, officers and representatives of the company as follows: L. R. MacKenzie, president; N. D. Dean, executive vice-president; H. L. Tillson, chief engineer, and R. M. Heine, chief chemist. The local Vibrolithic representative in St. Louis is H. W. Dawson.

American Wood Preservers Association to Show New Type Guard Rail

The Service Bureau of the American Wood Preservers Association will show models of creosoted timber bridges and culverts, together with photographs, etc. The only thing new will be a new type of treated guard rail post and rails.

Anthony to Show New Pipeless Hydraulic Hoist Dump Body

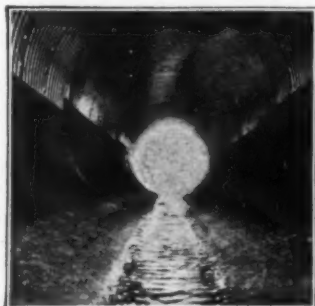
The Anthony Co., Streator, Ill., will make its initial showing of a heavy duty pipeless hydraulic hoist dump body in booth 31-B. Also will be shown other bodies which are included in their complete line. The advantages claimed for the new product include:

No piping or connections to blow out, leak or give way. Large surplus lifting capacity is given through use of a 6 in. cylinder. Working pressure is reduced to a minimum. Three point lifting mechanism dumps complete load wherever truck may stand regardless of twists or frame weaves. Gallon oil reserve. This is carried in the reservoir. Prevents air locks and stopping to add oil. The body will always raise to the maximum dumping angle. Body cannot "drop" from dumped position when released whether loaded or empty, but rapidly returns, settling on a cushion of oil: thus preventing damage to chassis. Body can be stopped, lowered and held in any position. Body can also be held, lowered, or raised while truck is in motion. 50° dumping angle. Extremely low loading height. Bottom of box 11½ in. from frame. High tailgate clearance—level with truck frame. Entirely of Anthony design and construction. Properly balanced, rugged construction. Controlled entirely from the cab by one power take-off lever and one hoist control lever.

Armco to Exhibit Latest Drainage Developments

Multiple paved-invert pipe, a recent development in drains of balanced design, and the latest application of perforated iron pipe to highway subdrainage, present the main attractions of the exhibit of the Armco Culvert Manufacturers Association, Middletown, Ohio, at the 1931 Road Show.

Five years of actual service for



Armco Paved-Invert Pipe

Armco paved-invert culverts have shown the value of balanced design—reinforcement at the point of greatest wear. The same period of service has also shown that greater protection could be gained from increasing the width of the pavement. Armco paved-invert pipe is now provided with two or more pavements, dependent upon the diameter of the pipe, and presents a smooth, wear-resisting trough in the invert of the culvert where the erosive action of abrasive materials is concentrated.

Illustrative of the increasing application of sub-drainage to the various phases of highway construction and maintenance are recent developments in the elimination of frost boils. During the past two years, a number of successful installations of Armco perforated iron pipe have been made for this purpose. Strength gained by flexible construction, durability proved by a service record of 25 years and an infiltration capacity more than ample for meeting field needs particularly fit this pipe for such work. Specimens of Armco perforated iron pipe, together with photographs and drawings showing the latest approved methods of installing it, are on display.

A running-water model including both Armco paved-invert and perforated iron pipe forms the main attraction of the display. This model shows how water enters perforated iron pipe and solids are excluded and, also, the manner in which the multiple pavement serves to protect culverts from erosive action.

The growing tendency among engineers to include detour, maintenance and operating costs in the total cost of a road or bridge project, has brought increased interest to the use of large-diameter culverts in meeting small bridge requirements.

This display, featuring subjects of timely interest to road builders, will be found in space A-119. The following representatives of the Armco Culvert Manufacturers Association are in attendance: S. R. Ives, vice-president and general manager; George E. Shafer, engineer of tests; M. C. Noble, regional manager; H. W. Gregory, regional manager and H. S. Claybaugh.

Asphalt Institute Exhibit

The Asphalt Institute, New York, N. Y., will have an interesting exhibit depicting various types of roads in models in Booth A-125. Bernard E. Gray, highway engineer, will be in charge.

Athey to Exhibit 14-Yd. Hopper Type Trailer

A feature of the exhibit of Athey Truss Wheel Co., Chicago, Ill., in booth A-66, building A, will be a 11-14 yd. hopper type rear dump trailer, which the company has added recently to its line.

Owing to the hopper type construction of this unit, material can be spread as it is dumped. This trailer is especially adapted for operation on those jobs where specifications require filled material to be laid down in layers, as a simple adjustment is provided on the gate to vary the depth of the layer of material from 6 in. to 18 in. Through this



Athey Truss Wheel Hopper Type Rear Dump Trailer (20), 11-14 Cu. Yd. Capacity

preliminary spreading, it is claimed, a substantial reduction in bulldozing is made, which in turn permits haulage equipment and roller to operate continuously, keeping the shovel working and speeding up the entire operation.

Hopper type trailers are designed for power shovel loading and the large door permits dumping of any stone or rock that can be handled by the dipper. Dumping is controlled by tractor operator, and door closes automatically.

Other Athey Truss Wheel equipment on exhibition includes the new improved Athey 3-way of 7-8 yd. capacity (15-ton), and a 5-6 yd. Athey 3-way dump trailer (10-ton) arranged for operation with elevating graders.

Austin 6-Cylinder Dual Drive Motor Grader

The exhibit of the Austin-Western Road Machinery Co., Chicago, Ill., at the 1931 Road Show will include the following items:

Austin six-cylinder 12½-25 Dual Drive motor grader equipped with front scarifier, pneumatic tires, electric starting and lighting system and special blade for oil-mix work.

Austin Model 20 Dual Drive motor grader with leaning front

wheels, electric lighting system and super-service blade for gravel road maintenance.

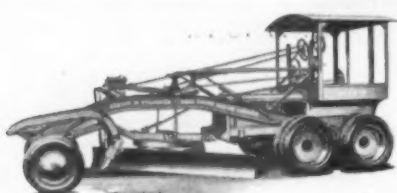
Austin 10-ton Autocrat roller with pneumatic scarifier, electric starter, power steering and wheel sprinkling system.

Austin 7-ton Cadet roller with pneumatic scarifier.

Austin Mammoth Senior leaning-wheel grader with front scarifier and back sloper.

Austin Contractor's Special elevating grader with engine-driven carrier.

Western Earthmover elevating grader with engine-driven carrier.



Austin Six-Cylinder Dual Drive Motor Grader

Western 5-yd. direct-hitch crawler dump wagon with automatic spring wind-up.

Western Tandem Drive motor maintainer with front scarifier.

The Austin-Western space bears the numbers A-43 and A-25.

Autocar Will Show Two Special Chassis

As the result of extensive engineering research in the field of ready-mixed and truck-mixed concrete during the past few years, the Autocar Co., manufacturers of precision-built motor trucks, will exhibit two special chassis at the Road Show.

One unit in the Autocar exhibit will be the Autocar Model C chassis, equipped with a 3-yd. Paris Transit mixer body. The Autocar Model C, with 186-in. wheelbase, is engineered in every detail to meet the unusual stresses imposed by the various types of heavy, rotating concrete-mixer bodies. For this reason it has attracted wide attention in the building-supply and contracting fields since its introduction last September. It is rated at $3\frac{1}{2}$ to 5 tons and is powered with the Autocar Blue Streak six-cylinder engine which develops 101 hp. at 2,400 r.p.m.

This chassis includes an auxiliary transmission which makes possible a road speed of more than 47 m. p. h. under full load. A new type of power take-off, specially designed for rotating concrete mixer bodies, is



Model C. Autocar with Paris Transit Mixer Body

mounted on the auxiliary transmission. The rear axle is the Autocar full-floating double-reduction type which has proved its dependability and power in heavy-duty dump work.

A companion chassis to the Model C is the Autocar Model SCHS, which will also be exhibited at the Road Show, equipped with a Wood hydraulic $3\frac{1}{2}$ -yd. body with extension sides and two division boards. Rated at 3 to $3\frac{1}{2}$ tons, this chassis is also powered with the Autocar Blue Streak six-cylinder engine. It has a 157-in. wheelbase and the Autocar full-floating double-reduction rear axle. When equipped with auxiliary transmission it is capable of a sustained road speed of 45 m. p. h. under full load. This chassis also has the standard large mounting S.A.E. power-take-off opening.

The Autocar exhibit will occupy space B-26 and will be in charge of Edward F. Sayers, assistant sales manager.

Automatic Signal Corporation Traffic-Control Systems

The Automatic Signal Corp., New Haven, Conn., will be at the show, displaying Electro-Matic and Traff-o-Matic vehicle-actuated automotive-traffic dispatching systems.

Traff-o-Matic is a semi-vehicle-actuated device, designed for use at the intersection of a heavily-traveled main thoroughfare with an infrequently-traveled minor cross street.



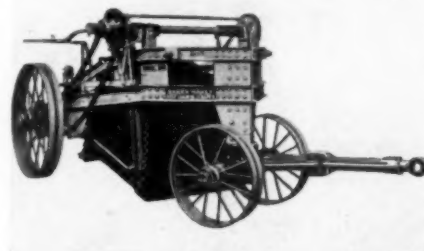
Control Housing of Automatic Signal Corp.

It is equipment for intersections where the traffic problem is simple. Electro-Matic full-vehicle-actuated equipment is designed for major intersections, such as an intersection of two or more heavily-traveled streets where the problem is complex and the traffic fairly well balanced. Hundreds of installations of these types of equipment have been made during the past two years.

Baker Mfg. Co. Will Use Increased Space

The Baker Mfg. Co., of Springfield, Ill., will use increased space at the 1931 Road Show to exhibit leading items of their line of tractor equipment. Space location is A-33-40. Among the features will be the new Timken-equipped Baker-Maney scrapers, Models DR, $1\frac{1}{2}$ -cu. yd., and KR, 1-cu. yd. capacity.

Baker hydraulic bulldozers and backfillers will be effectively displayed to show the novel method of operation and outstanding construction features. There will be shown



Model DR Baker-Maney Scraper

a model of the Baker one-man automatic road maintainer, as well as several sizes of Baker rotary scrapers.

The exhibition will be in charge of J. G. Miller, vice-president and sales manager, assisted by other officers and sales representatives of the company, including E. E. Staley, W. C. Staley and L. A. Ginzel.

Barber Asphalt Exhibit

The Barber Asphalt Co., Philadelphia, Pa., exhibit features Trinidad and Bermudez Native Lake Asphalts for paving. An interesting feature is a large scene-in-action display which consists of a large painting on glass, mounted in a beautiful gold frame. The scene shows a modern city of the future with wide, asphalt paved streets carrying local traffic while a wider, elevated, asphalt boulevard, similar to the one recently opened in New York City, carries inter-city express traffic. The figure of Christopher Columbus, standing

in the bow of his caravel looking out across the sea at three distant mountain peaks, is also shown in the display. Moving signs at the bottom of the display explain that Christopher Columbus discovered Trinidad in 1498; that the first Trinidad Lake asphalt pavement was laid in Newark, N. J., 61 years ago; and that many countries have adopted Trinidad Lake asphalt streets because they have withstood heavy traffic under all climatic conditions. Other signs explain that Bermudez Lake asphalt was first used as a bituminous binder in asphalt highway construction 39 years ago in Detroit, Mich.; that roads and streets constructed with Bermudez Lake asphalt withstood the destructive action of traffic in many countries for long periods of time.

Cuts of old Trinidad Lake asphalt and Bermudez Lake asphalt pavements which have been in service for many years on streets in Washington, D. C., as well as cross sections of Trinidad and Bermudez sheet asphalt and asphaltic concrete pavements, samples of Crude Trinidad and Bermudez Lake asphalts, refined Trinidad and Bermudez Lake asphalts and Trinidad and Bermudez Lake asphalt cements are included in the exhibit. A section of a concrete highway which was repaired with Genasco Crack Filler as well as an exhibit showing the use of Curcrete, an asphalt emulsion used in curing concrete pavements, are also shown.

The booth is in charge of J. E. Morris, manager street and road department.

Barber-Greene to Show New Bucket Loader With New Weigh Hopper

Barber-Greene Co., Aurora, Ill., in addition to other equipment, will show a new bucket loader having a new dial-scale weighing hopper; this



Model 62 Bucket Loader with New Weighing Hopper

is claimed to weigh within 0.4 to 1 per cent. of absolute accuracy even while the bucket loader on which it is mounted is operating at an angle of 4 deg.

The weighing unit built into this hopper is an American Kron scale. The dial on the scale is graduated into 2 lb. units and is provided with two markers which may be set to indicate the desired reading. Directly above the weigh hopper is a small auxiliary hopper holding approximately 360 lb. of material. At the top of the weigh hopper itself is a sliding horizontal gate controlled from the operator's platform by a chain. When the indicator hand on the scale dial is near the desired weight reading, the sliding horizontal gate is closed, allowing the auxiliary hopper to fill up. By working the sliding gate with the chain, the material is allowed to feed from the auxiliary hopper into the weigh hopper until the required batch is present.

The weigh hopper will weigh batches up to 3,600 lb. not to exceed 32 cu. ft. in volume. In actual operation at Brockton, Mass., the loader and weigh hopper were able to load trucks consistently at a rate of three 1,100 lb. batches in 50 seconds, the operator in each case coming within 3 lb. of exact weight.

The loader on which this weigh hopper is mounted is the new Barber-Greene Model 62 super bucket loader, a crawler mounted, self feeding, one-man operated machine. This machine has all the standard features of any Barber-Greene loader with some new features of its own. It has, in addition to the standard overload release sprocket for protection to the machine against strains due to an overload on the bucket line, an overload release sprocket on the crawler drive to protect the machinery there. It feeds itself by means of two 42 in. discs that lie flat on the ground and revolve inward, crowding the material into the buckets. An adjustable scraper directly behind the feeding discs clears a path 7 ft. 6 in. wide, the overall width of the machine. The capacity of the loader is 62 cu. ft. per minute.

Members of the Barber-Greene organization who will attend the show are: H. H. Barber, president; W. B. Greene, vice-president; W. A. Buell, assistant sales manager; J. F. Janda, chief engineer; W. B. Holder, eastern division sales manager; D. B. Frisbie, western and southern division sales manager; J. M. Bruns, ditcher division head; E. L. Benson, conveyor division head, and Jack Turner, publicity manager.

Barrett to Demonstrate New Filler

The central part of the exhibit of The Barrett Co. this year as has been the case for the past several Road Shows, will be the big Tarvia truck from which sweet cider will be served to all comers. Doubtless this feature will be as popular as ever this year.

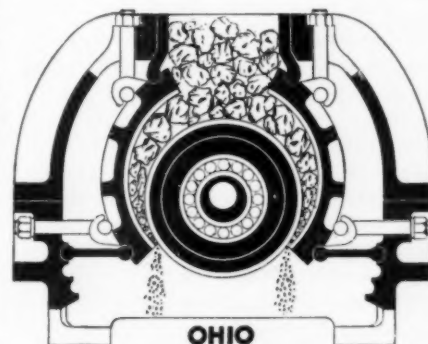
The pre-mixed tar macadam "Tarvia-lithic" will be featured in the exhibit. Samples of the various sized mixtures and sections of actual pavements will be on display.

A new and radically different concrete joint and crack filler called Plastic Tarvia-XC has been perfected by the Barrett research organization and will be demonstrated at the Road Show. This material has been thoroughly tried out in various parts of the country.

As usual, The Barrett Co. will be represented at the Road Show by Tarvia executives and engineers from all parts of the covered territory.

Beans Foundry Co. Will Exhibit New Crusher

The James H. Beans Foundry Co., Martins Ferry, O., will exhibit a new crusher designed for reduction or secondary work, and built around an entirely new idea. The machine



The Ohio Crusher

which the manufacturer claims is quiet running, and practically free from vibration has but one moving part, and will be known to the trade as the "Ohio crusher." The frame is a heavy steel casting and supports the one moving part—an unusually heavy alloy steel eccentric shaft. The shaft rotates on Timken roller bearings, which are mounted in the sides of the frame, and which are effectively protected against the entry of water and dust by positive oil seals. On the eccentric portion of the shaft a steel cylinder is mounted—also on Timken bearings—which has removable wearing

plates of manganese steel. The cylinder does not revolve. It oscillates in all directions between two curved manganese crushing plates, which are rigidly attached to the front and rear of the frame. Adjustment for size and wear is obtained by moving the lower end of these plates in or out as required. The adjustment is positive, quick, and easily made.

Material to be crushed is fed into the top of the machine directly on the oscillating cylinder, flows downward on both sides of it and is crushed between the cylinder and the two crushing plates. The crushing action is true compression—that is compression without a rubbing or abrasive action—which reduces wear on the crushing surfaces, and minimizes the production of fines.

The manufacturer now has two sizes in production, and others are to follow rapidly. The smaller machine weighs 8,750 lb.; has an opening $4\frac{1}{2} \times 24$ in., and a rated capacity producing 1 in. material, of 30 to 40 tons per hour. The larger machine weighs 11,600 lb., has an opening $4\frac{1}{2} \times 36$ in., and is rated at 50 to 60 tons per hour producing 1 in. material.

Black & Decker Will Exhibit Loadometers

The Black & Decker Mfg. Co., Towson, Md., will exhibit at the Road Show in St. Louis, their Drive-On loadometer, which is a portable weighing device for determining the gross axle and wheel-load weight of motor trucks on the highway; the test loadometer, which is an instrument designed for measuring the compressive strength of concrete pipe and other concrete products; the Black & Decker valve refacer and other units of the electric-tool line which are especially adapted to the maintenance of highway equipment.

E. E. Powell and H. L. Prince, of Black & Decker, will be glad to welcome the officials of highway departments and other delegates to the Road Show at Booth A-92.

Blaw-Knox Exhibits Much Road and Street Equipment

The Blaw-Knox Co., Pittsburgh, Pa., will exhibit the following equipment:

Portable bulk cement plant for road contractors, 110 bbl. capacity, equipped with 1,000 lb. Blaw-Knox cement batcher 1931 design.

The Cementank, a new Blaw-

Knox development for the transportation of bulk cement. Fits into the batch compartments on trucks.

The 7 yd. Blaw-Knox wagon grader equipped with crawler tracks for fast operation.

The new 8 in. base Blaw-Knox road form will be exhibited as well as the complete line of Blaw-Knox 6 in. base road forms.

Blaw-Knox weighing batchers for weighing three types of aggregates to be used where the coarse aggregate is divided into two sizes.

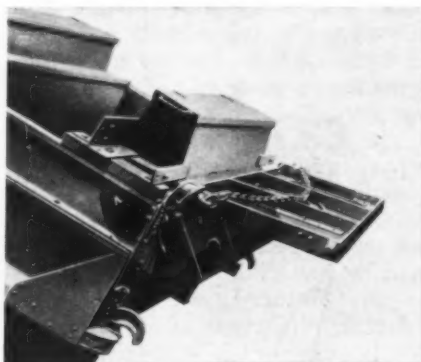
The Blaw-Knox agitator truck body mounted on a motor truck equipped with revolving blades geared to the truck transmission to keep the concrete in constant agitation during transit.

51 ton Blaw-Knox weighing batcherplant equipped with a Blaw-Knox double weighing batcher.

Popular types of Blaw-Knox clamshell buckets and dragline buckets will be on display.

Blaw-Knox street and sidewalk forms. A complete assortment of various types and sizes of these popular forms will be exhibited.

The Ord finishing machine. This



Blaw-Knox Cementank

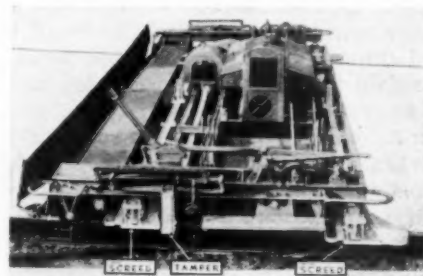
machine will be shown in operation on Blaw-Knox road forms and a new development of the Ord finisher is that when dry, stiff concrete is used, and tamping is permitted or specified, the Ord can be furnished with a tamper without sacrificing the accepted double screed principle. This finisher can be furnished as desired—with single screed; with double screed; with single screed and tamper; or with double screed and tamper.

The cementank, mentioned above, is a steel cement container for batch trucks on highway paving or other work where the cement is proportioned into compartment trucks at a central plant, and then hauled to the paver or mixer.

It is welded steel construction, moistureproof, equipped with a hinged top cover and a discharge

door which opens automatically when the compartment is dumped. The cementank requires absolutely no attention on the part of the operator, the cement empties by gravity and flows with the aggregates into the skip of the mixer. Arching of cement is prevented by the shape of the tank and its method of discharge.

The discharge door is flashed with



Ord Finishing Machine with Two Speeds and Tamper

felt to prevent leakage of cement. Locking of the end gate or truck partition automatically locks the discharge door of the cementank.

The Cementank has a capacity of 10.35 cu. ft., which is ample to take care of a 7-bag batch.

The accompanying illustration shows the construction of the cementank, and its arrangement in a truck compartment. The Blaw-Knox cementank is covered by Patents Nos. 1624122, 1624376 and 1650249.

Brockway Exhibit

The Brockway Motor Truck Corp., Cortland, N. Y., will exhibit its Model 141-Brockway-Indiana $2\frac{1}{2}$ ton road builder with two batch dump body together with a Brockway-Indiana $1\frac{1}{2}$ ton maintenance truck equipped with $1\frac{1}{2}$ yd. dump body and hydraulic underbody hoist; Brockway-Indiana Model 195— $3\frac{1}{2}$ ton chassis equipped with 800 gal. South Bend distributor, and the Brockway-Indiana Model 290— $7\frac{1}{2}$ ton chassis with pneumatic tires. All of the models in the display are powered with 6-cylinder engines. The exhibit will be in booth B-41 and will be in charge of H. K. York, general manager of the western division, Indiana Truck Corp.



Model 141, Brockway-Indiana $2\frac{1}{2}$ Ton Road Builder

Broderick & Bascom Will Show Yellow Strand

The exhibit of the Broderick & Bascom Rope Co., St. Louis, Mo., will be the same as that shown at the Tulsa oil field exposition. This exhibit, a picture of which is shown



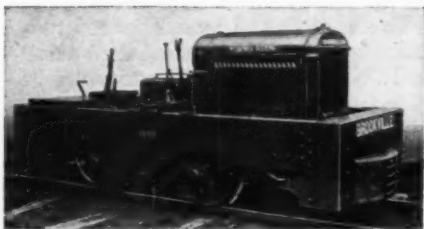
Broderick & Bascom Exhibit, Photographed at Tulsa Oil Field Exposition

herewith, attracted quite a bit of favorable comment at Tulsa. Among the features of interest is a massive three-piece carving set forged from lengths of Yellow Strand rope.

Brookville to Exhibit New Locomotive

The Brookville Locomotive Co., Brookville, Pa., will exhibit for the first time one of its new series of locomotives. The company is offering two new models: the 8-ton BMD-8 and the 10-ton BMD-10, each of which is powered by the McCormick-Deering Model 300 industrial power unit, accompanied by a five speed transmission and a clutch also manufactured by the International Harvester Co. In accordance with the policy followed in designing all Brookville locomotives, these standard units are installed in the chassis without alteration. As a result of this simple arrangement, the entire power plant and transmission, necessarily the most complicated parts of the locomotive, can be serviced at any International Harvester Co. branch.

The Brookville enclosed gear reverse used in these models, makes all five speeds of the standard International Harvester transmission avail-



The BMD-8 Locomotive

able in either direction, providing an unusual number of speeds for an industrial locomotive and, in turn, unusual performance. Speeds from 2 up to 16 miles per hour are available for saving time on the run and the gears can be shifted while the load is under momentum.

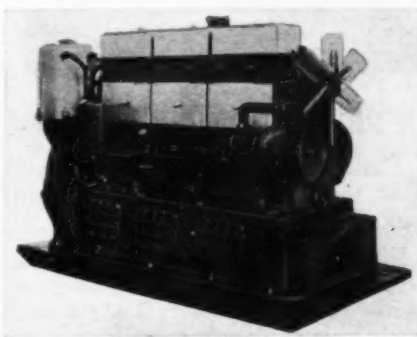
Similar to other Brookville locomotives, the BMD-8 and BMD-10 are equipped with dual spring journals and wide wheel faces, in order to facilitate use upon rough and crooked tracks.

The BMD-8 and BMD-10 are available in any gauge from 22 in. to 56½ in., or wider; and equipped with either four pocket link and pin type couplers or with MCB couplers for use with standard freight cars. Wheelbase, overall height and other dimensions are variable, within limits, to suit requirements.

The exhibit will be in booth A-46, R. B. Eiseman and Wm. Briggs will be in attendance.

Buda Exhibits Diesel and Gasoline Engines

The Buda Co., Harvey, Ill., announces two models of diesel engines and five models of gasoline engines



Buda 180-Hp., Six-Cylinder Diesel

that will be on exhibit at the Road Show in St. Louis.

A 120-hp. diesel power unit will be shown which is a 6½x8¾-in. full diesel engine of the four-stroke-cycle, compressorless type, operating at speeds from 400 to 1,000 r.p.m. The power-unit style of diesel is adapted to a variety of applications such as generator sets, rock crushers, saw mills, dredges, ice machinery, compressors, blowers, oil-field drilling and pumping, etc. A 180-hp. diesel will also be exhibited as a bare engine. This is the type widely used in connection with excavators.

The following gasoline engine models are also being shown: Models BA-6, JH-4, FR, H-199 and H-298. The gasoline engines being shown are being extensively used in such units as welders, compressors, rock crush-

ers, concrete mixers, generating sets, shovels, ditchers, oil field apparatus, etc.

R. K. Mangan, sales manager of the industrial division, will be in charge of the exhibit. Other Buda representatives who will attend are L. M. Viles, president; H. M. Sloan, general sales manager; L. H. Earle, manager of the New York office; L. F. Shoemaker, sales engineer, and A. F. Ochtman, sales engineer.

Buffalo-Springfield Rollers

The Buffalo-Springfield Roller Co., Springfield, Ohio, will occupy spaces A-54 and A-60 at the Road Show. They will have on exhibition one



Large Size of Buffalo-Springfield Roller

Buffalo-Springfield heavy-duty gasoline-motor-driven tandem roller and four sizes of Buffalo-Springfield multiple-cylinder, motor-driven, three-wheel rollers that will range in weight from 5 to 17 tons.

The largest size, while not new, is rather unusual in the middle west. There are four of them in the service of the city of St. Louis.

Buhl Will Show Three Portable Compressors

The Buhl Co., Chicago, Ill., will occupy space B-3 at the Road Show. Their exhibit will consist of one each of Types FJ-36, WB-110 and WB-220 Buhl portable air compressors. The exhibit will be in charge of W. I. Buhl, president; George R. Stege, Jr., secretary, F. C. Marshall, chief engineer and George C. Theall, eastern manager.

Bunting Brass & Bronze Co. Shows Bearings and Bushings

Bunting Brass & Bronze Co., Toledo, O., will occupy Booth B-96, where it will show a complete line of Bunting products, as follows: Cored and solid bronze bearing bars, standard stock finished bushings, cast bronze thrust washers, bronze back babbitt lined bearings made to manufacturers' specifications and special bronze bushings and bearings of many types made to customers' blue

prints. L. H. Firth, M. E. Clark and H. R. Holt will have charge of the exhibit.

Burch Will Demonstrate Plow, Unloader

It is anticipated that the exhibit of the Burch Corp., Crestline, Ohio, will include a snow plow, and that the Burch car unloader will be demonstrated. The Ross plow, manufactured by the Burch Corp., is



Ross Snow Plow, Exhibited by the Burch Corp.

shown in the accompanying illustration. The demonstration of the car unloader will probably be in the form of a model of this device.

Butler Bin Co. Exhibit

The Butler Bin Co., Waukesha, Wis., has been assigned in the arena, space AR-16. There they will display their latest type of contractors portable bin, equipped with a new and improved weighing hopper. There will also be shown a road contractors portable bulk cement handling plant. The balance of the exhibit will consist of a motion picture taken in the field, and several small models of aggregate proportioning equipment. A considerable portion of the exhibit will be devoted to central mixing plants with new bulletins, layouts, etc. The exhibit will be in charge of M. R. Butler, A. R. Morton, C. E. Riblet, and M. Kelley.

Byers Will Show Excavator Trailer

The Byers Machine Co., Ravenna, Ohio, will exhibit the Byers Model 40 excavator at the St. Louis Road Show.

This machine weighs only 10 tons



Rear View of Byers Trailer

complete with a shovel attachment; is three-quarter-swing and has four travel speeds—from $\frac{1}{2}$ m.p.h., to high, approximately $2\frac{1}{2}$ m.p.h. A trailer to transport the Byers excavator has also been developed, and this trailer can be attached to or dismounted from the machine in 20 minutes. The trailer consists of two bar axles on which are mounted heavy, wide, rubber-tired wheels. Structural brackets, to which these axles are attached, are built into the main frame of the excavator so that all it is necessary to do to transport the excavator on a trailer is to attach the two axles and the trailer with its load can then be hauled behind any standard truck at speeds of from 20 to 25 m.p.h.

The excavator is designed with the same type of power and finger-touch clutches, oil-worm boom hoist, Timken-mounted jackshaft, direct chain drive from motor to jackshaft and other features that are used in the $1\frac{1}{4}$ -yd. machine. All of the machinery is mounted in a unit steel casting which holds the shafts in positive alignment irrespective of any twists that may be put on any of the structural members of the frame. The accompanying illustration of the trailer will give a good idea of just how this trailer is attached to the excavator.

Philip Carey Products

The Philip Carey Co., Cincinnati, Ohio, will exhibit Elastite expansion joint, asphalt plank and rail filler.

Elastite expansion joint has been used in concrete work for the past twenty years, is widely known and needs little explanation.

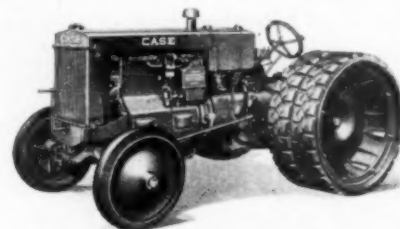
Elastite asphalt plank was first produced by the Philip Carey Co. about six years ago and is now being extensively used as a wearing surface on bridge floors, industrial plant floors, runways, traffic aisles, and railroad crossings, and for other similar types of service.

Elastite rail filler is a premolded bituminous cushion applied in street-railway track rails between the rail and pavement. It is furnished to fit any rail section. Its use reduces noise, protects track structures and cuts down pavement repairs. These results are obtained through the ability of the material to absorb vibration and shock that would otherwise be transmitted to the adjacent pavement. Elastite rail filler is now in use in more than 200 electric railway properties in this country and Canada.

J. I. Case Tractors

The J. I. Case Co., of Racine, Wis., will be at St. Louis, showing their new line of road and industrial tractors. While comparatively new in this field, these tractors are now available as power units in leading makes of equipment for road maintenance and road building. In addition to the new tractors in the Case display, several equipment companies will be showing Case tractors with equipment on them. The Case Co. will show the following models: the CI with dual pneumatic, the CI standard tread solid tires and the LI standard tread solid tires.

Unusually compact size and short turning are outstanding advantages of these new tractors which appeal particularly to road-building machinery and maintainer people. For example, the Model CI, the smaller of these tractors, is only 61 in. wide and 48 in. high and has a wheelbase of only 66 in. It has an outside turning radius of but 10 ft. The design of these tractors lends itself admirably to mounting of all sorts of attachments and equipment for in-



Case LI Industrial Tractor

dustrial and road work. Engine power for driving attachments can be delivered at three points. The tractors are comfortable and easy to handle as well as simple to care for. The steering gear is irreversible, yet very fast. Case representatives at the St. Louis show will be glad to go into further detail with anyone desiring additional data or information.

"Caterpillar" to Exhibit 18 Tractors and 8 Graders

Caterpillar Tractor Co., Peoria, Ill., will occupy space A-26 in building A.

The exhibit will be in charge of A. E. Loder, recently promoted to assist O. L. Starr, vice-president in charge of manufacturing. Mr. Loder will be assisted by eight Caterpillar district representatives on the show floor. Charles Spears, who has just recently been promoted by Caterpillar to supervisor of construction and governmental sales, will also attend

the show with his newly appointed staff of construction and highway engineers. J. D. Fletcher, now head of the Export Department of the Caterpillar Tractor Co., will also attend the show with a staff to contact foreign visitors.

The Caterpillar Tractor Co. will



Model Ten "Caterpillar"

show the following equipment:

15 motor patrol, 15 trailer patrol, 20 planer, 30 leaning wheel grader, 60 leaning wheel grader, 60 elevating grader mounting a Caterpillar twenty engine, super special grader, 10 grader, 60 Caterpillar with snow plow, 30 Caterpillar, 20 Caterpillar, 15 Caterpillar, 10 Caterpillar, 10 High Clearance Caterpillar, 15 Caterpillar with side seat, 20 Caterpillar with side seat.

Central Iron & Steel Co. Will Exhibit

The Central Iron & Steel Co., general office and mills at Harrisburg, Pa., proposes having a very interesting exhibit at the Road Show. Their Knobby non-skid floor plates, traffic treads, etc., are being extensively used in road construction and road-building machinery, and they will have exhibits of the various plates they make and their applications.

Mr. Irons, president of the company, together with his technical road staff, will be in attendance.

Chicago Pneumatic Tool to Show Compressors

Chicago Pneumatic Tool Co., New York, will occupy booth B-44-A. A CP portable gasoline engine driven air compressor will be exhibited as well as a CP 120 ft. duplex single stage, direct connected motor driven air compressor mounted on skids. This latter machine will be in operation to furnish air for the various CP tools to be displayed. These will include rock drills, pavement breakers, sheeting drivers, backfill tampers, clay diggers, woodboring machines, riveting hammers, chipping

hammers, calking hammers, grinders, concrete surfacers, electric hammer drill and a CP Quimby sump pump. The following Chicago representatives are expected to be in attendance at the booth: J. F. Huvane, J. W. Zinkgraf, G. J. Lynch, T. McElligott.

Cities Equipment Corpora- tion Shows 15 Cu. Yd. Refuse Collector

The Cities Equipment Corp., New York, N. Y., will occupy spaces B-53 and B-70, and will exhibit the Von Keller refuse collector. This collector has a slowly revolving tank pitched downward at an angle of 15 degrees which trims the load, making it unnecessary for workers to spread the load by "rolling" containers. The machine will carry approximately 15 cu. yd. of material. Ashes, gar-



The Von Keller Refuse Collector

bage, rubbish and snow are easily loaded, transported and dumped. Due to the fact that the tank revolves while dumping the load is easily ejected.

Cleaver Tank Car Heater

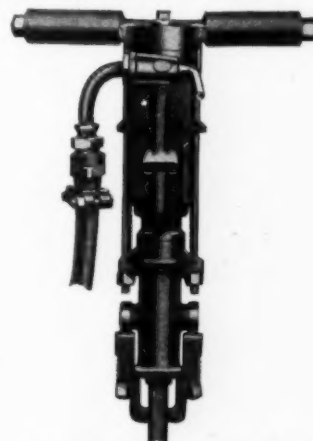
The J. C. Cleaver Co., Inc., Oregon, Ill., will show their improved tank-car heater at St. Louis. This is a compact outfit, embodying a New Era steam boiler. This boiler is stated to give a boiler horsepower from 5 sq. ft. of heating surface. It burns fuel oil. The outfit features the patented Cleaver closed circuit, which makes necessary but 30 gal. of water in heating a 10,000-gal. tank car. Other features are 150 lb. of working pressure in 15 minutes from a cold start, pneumatic tires and four-wheel high-speed mountings.

Cleveland Rock Drill Co. Exhibit

The Cleveland Rock Drill Co., Cleveland, O., has been assigned Booth B-28, in which it will have a complete exhibit of Cleveland products. On exhibition will be Models

H7 and A1B hammer drills, and in addition a new Model H6, two of which can be operated from a compressor of 120-cu. ft. capacity.

The company will show also its Model C7 paving breaker, its Models



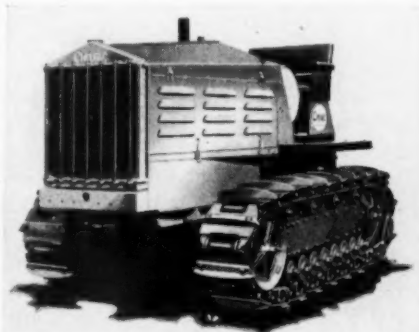
New Model H6, Light Drill

CD5 and TD5 pneumatic diggers, its Model D7 tripod drill, the No. 5 backfill tamper and its very complete line of accessories.

In addition there will be a working model of the H7 sinker, this being cut open in the backhead, cylinder, and chuck housing in such a way as to permit the observation of the inside workings of the drill. This machine will be operated in "slow motion," so that the operation of the valve and hammer, and also the rotation parts can be observed.

Cleveland Tractor Co. to Show Complete Line

The Cleveland Tractor Co., Cleveland, O. exhibit will consist of the complete line of Cletrac crawler tractors, composed of Models 15-20-(40-30)-40 and (80-60) Cletracs. A larger space has been contracted for and the Cletrac exhibit is expected to



80-60 Cletracs

be bigger, more elaborate and of greater interest than any ever conducted at a previous show.

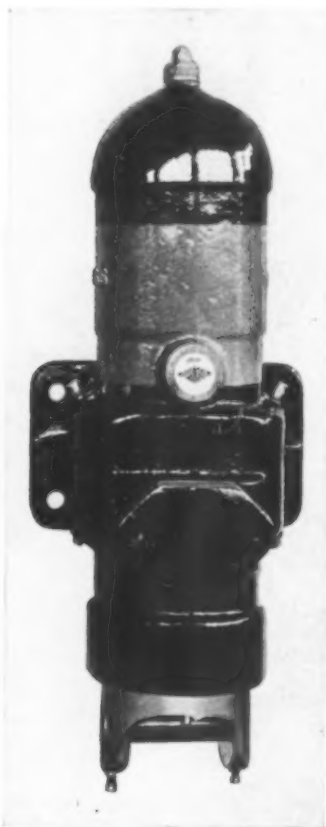
The entire list of officials and department heads at the factory will

attend, as well as the entire force of field salesmen for the whole United States.

The display will be conducted in the exhibition hall in adjoining spaces 24 and 44.

Cleco Air Springs Shown on Huge Truck

The giant model of the Cleco Gruss air springs, products of the automotive division of the Cleveland Pneumatic Tool Co., Cleve-



Mogul Type, Cleco Gruss Air Spring

land, Ohio, of which F. H. Burr is director, is mounted on the new 10-ton, multi-engined truck of the Relay Motors Corp., of Lima, Ohio. Known as the Mogul type, the Cleco air springs on this vehicle, which makes its debut at the Road Show, are the latest and largest of the automotive products of the Cleveland Pneumatic Tool Co.

The Mogul model has a 4½-in. bore and a 6-in. stroke, is adapted to the shackle front-end hook-up with the steel springs as well as the rear-end shackle hook-up of a truck and is designed to reduce to a minimum all road shock for the heaviest of modern trucks and buses. This type is built for motor vehicles of from 7½ to 15-ton capacity.

All sizes and types of Cleco Gruss air springs as well as models of the new Cleco Multi-Power booster brake will be shown in booth B-102. The exhibit will include an electrically-operated set or air springs, showing their mechanical action in destroying road shock to trucks and a demonstrating display of the booster brakes.

Clinton Exhibits Improved Conveyor-Conditioner

The Clinton Motors Corp., Reading, Pa., will exhibit at St. Louis one heavy-duty Clinton truck on which is mounted one 3-yd. Clinton concrete conveyor-conditioner and a Wood Lift hoist.

The concrete conveyor-conditioner body will incorporate the most recent developments. The size of the discharge door opening in the rear has been increased to 16x34 in.; this is practically twice the size heretofore used. In making this change the rear trunnion and bridge support have been removed. This tends toward easier operation of the discharge by the driver. The rear of the tank is now mounted in a heavy steel cradle and revolved on roller bearings. This large discharge opening makes it possible to discharge any slump concrete required, it is stated.

The latest Clinton truck has more power than ever before, seven speeds forward, two reverse, pneumatic tires, electric starting and lighting, closed coupe-type cab, booster brakes and booster springs. It is altogether a much more efficient unit, built expressly for the purpose of transporting ready-mixed concrete in a revolving agitating body.

The Clinton space number is B-13, in the north building, first aisle next



Clinton Concrete Conveyor-Conditioner

to main arena. The exhibit will be in charge of George M. Bunn, sales manager, assisted by Roger Vollmer, salesman. A. E. Hoffman, general manager of Clinton Motors and the inventor of the Clinton concrete conveyor-conditioner, will be in attendance during the show.

Collins Will Display Warning Signals

Thos. E. Collins & Co., St. Louis, Mo., will be represented at a Road Show for the first time. This company has always specialized in heavy waterproofed fabrics of all kinds, and has been manufacturing signs and signals for three years.



Fabrikoid Sign for Use in Repair and Maintenance Work

Redteco and Yelteco, a new fabrikoid sign, will be shown at the Collins booth. These signals, it is stated, wear like leather and look like steel from the driver's seat. This is of advantage, since these signals are made for repair and maintenance purposes only. They are in use by several state highway departments.

The heavy cotton fabric that has been used in South Carolina and Texas on gravel roads will also be displayed. This fabric has been recommended by the Cotton Textile Institute as a preventive of the washboard effect sometimes met with in gravel roads subjected to hard usage.

Colprovia Process Will Be Demonstrated

Colprovia Roads, Inc., New York, N. Y., will exhibit the following at the Road Show:

Samples of various types of pre-mixed asphaltic paving material manufactured by the Colprovia process using different types and sizes of aggregate from sand and quarry screenings to ½-in. stone.

Samples of the material both before and after compression.

Photographs of pavements manufactured by the Colprovia process and of asphaltic pavement plants

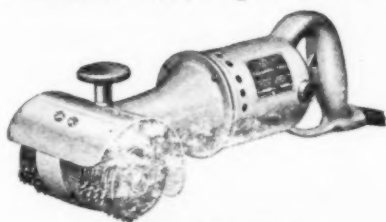
equipped for the practice of the Colprovia process.

The manufacture in a model pug-mill mixer of asphaltic paving material by the Colprovia process.

There will also be a demonstration in a hydraulic press of the effect of compression on the material manufactured in the model mixer, as well as various demonstrations of the properties of the loose and compressed material manufactured in the model mixer.

Concrete Surfacing Machinery Co. to Show New Tool for Removing Scale from Bridges

The Concrete Surfacing Machinery Co., Cincinnati, O. will exhibit a new Berg tool for removing paint, rust and scale from steel structures. This tool has two cutter bundles—24 hardened steel, 14-pointed cutters



Berg Cleaning Tool

in each bundle—mounted on both sides of a gear housing. This set of cutter bundles (totaling 48 cutters) revolves at 2000 r.p.m., causing the cutters to be thrown outward by centrifugal force. This action thoroughly cleans the surface without injury. The depth of the cutter contact is regulated by an easily adjusted depth shoe. The complete tool weighs only 8 lb. It is made in two models—electric and pneumatic. The company also will exhibit its Berg highway surfacer—a machine for cutting down high spots, uneven expansion joints, surface irregularities and repair patch. The Berg concrete surfacer and finisher likewise will be exhibited.

Three New Continental Products

The space number of the Continental Motors Corp., Muskegon, Mich., at the Road Show will be B-60.

There will be shown a DeLuxe H-series engine of removable-sleeve, overhead-valve, dry-sump-lubricating type.

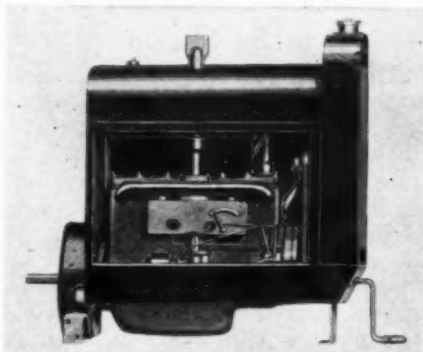
There will also be a new small six-cylinder power unit, Model P640, which is a 3 $\frac{3}{8}$ x4-in. engine developing 40 hp. at 1,600 r.p.m. This motor

will be of gear-front-end type, with mechanical governor, center-outlet exhaust, equipped for either magneto or distributor ignition, four-bearing crankshaft 2 $\frac{3}{8}$ in. in diameter and provision for oil filter and fuel pump.

The third model will be the new M9 four-cylinder industrial engine, 4 $\frac{1}{8}$ x4 $\frac{1}{4}$ in., developing 31 hp. at 1,200 r.p.m., three-bearing crankshaft 2 $\frac{7}{8}$ in. in diameter. This is a rugged engine designed especially for industrial heavy-duty service. It is equipped with center-outlet exhaust and has provision for magneto or distributor ignition and a mechanically-operated governor.

In addition to these two engines and the power unit, there will be on exhibit a neon-lighted board of parts which will display precision-built workmanship embodied in Continental products.

Stuart Nixon will be in charge of this exhibit. Those attending the show will be W. R. Angell, president; L. J. Kanitz, general sales manager; Ray Long, sales engineer; W. N. Fitzgerald, Jr., sales engineer; R. J. Middleton, sales engineer;



Continental Power Unit, Model P640

Stuart Nixon, sales engineer; J. A. Kraus, sales engineer; H. D. Stevens, west coast sales representative; M. H. Schachner, sales engineer; L. P. Kalb, chief engineer; S. F. Evelyn, chief industrial engineer; O. R. Baird, manager automotive sales, and A. R. Smith, manager industrial sales.

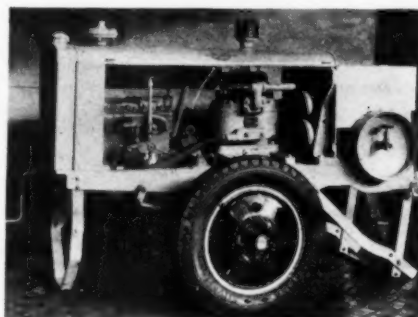
Headquarters will be at Hotel Chase during the duration of the show.

Curtis Shows New Line of Compressors

The Curtis Pneumatic Machinery Co., St. Louis, Mo., will exhibit for the first time its new line of Curtis Model "C" high speed Timken roller bearing, carbon-free, portable compressors. This line is made in four sizes and two styles, the 40 and 60 cu. ft. capacities are two wheel high-

way trailer type portables. The 80 and 120 ft. capacities are four wheel truck trailer types. This line of compressors has been under development and in trial service for the past two years and will be initially introduced to the trade at the Road Show.

The company also exhibit a small



Curtis 60 cu. ft. Compressor

self-contained gasoline engine driven air compressor outfit which is being successfully used by several state highway departments for a special purpose. Likewise it will show Curtis hydraulic washers for washing highway and contractors' trucks and an electric driven compressor outfit particularly adapted for use in service stations and repair shops of highway contractors and state highway departments.

A working model of a Curtis oil-locked hydraulic truck and bus lift also will be exhibited.

Cyclone to Show Guard Fence

The display of the Cyclone Fence Co., Waukegan, Ill., will be similar to what it has been in the past, showing woven-wire road-guard, the booth number being A-72.

Their representatives present will be J. H. Kinney, general manager; H. G. Chapman, general sales manager; and R. E. Pinniger, district sales manager.

Davey to Exhibit Four Compressors

Four Davey air-cooled compressors will be shown in booth B-165 at the 1931 Road Show. One feature of the Davey display which is expected to create unusual interest among visiting contractors is the standard 142-cu. ft. Davey compressor mounted on a Caterpillar 20 tractor.

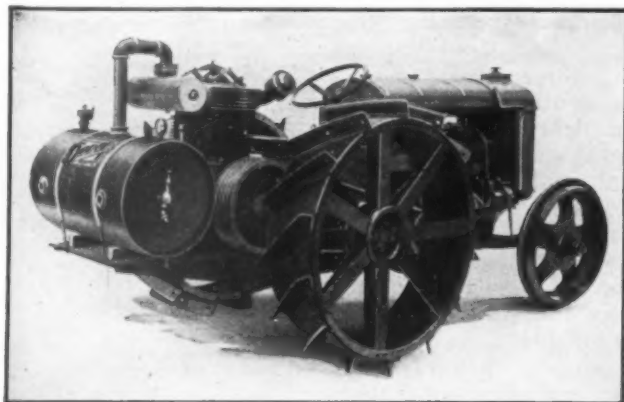
Tractor mounted, the Davey brings compressed air directly to the points along a job where it is needed and at otherwise inaccessible places where long piping is expensive to lay

and inefficient to operate. The Davey does not disturb the tractor's balance or restrict its drawbar operations.

Three other Daveys will be exhibited at the Road Show. One of

136 in. wheelbase Dodge truck chassis. It will be equipped with 1½-yard gravel body, power hoist and portable compressor.

On display at the motor freight exposition, there will also be a



Davey Compressor Mounted on Fordson Tractor

these is a 142-cu. ft. trailer-mounted compressor. One is a new 110-cu. ft. trailer unit powered by a Ford Model A engine. This new compressor weighs 2,000 lb., and its overall dimensions are 60 in. high by 40 in. wide by 76½ in. long. A 10-in. Twin Disc clutch which will help easy starting is standard equipment. The fourth Davey unit to be exhibited is a mounting with the 1930 Fordson tractor. This unit uses the 142-cu. ft. Davey air-cooled compressor, but sheave ratios have been designed to produce a displacement of 120 cu. ft.

W. W. Warner, chief engineer of the Davey Compressor Co., Kent, Ohio, will be in charge of the Road Show exhibit. Other factory representatives will include M. L. Gibson, R. N. Jensen and W. E. Murphy.

Dodge Exhibits New Trucks

Dodge Brothers Corp., Detroit, Mich., will have a representative showing of the new Dodge standard and heavy duty trucks in exposition building B, spaces 13 and 15. On display will be chassis equipped with dump bodies, road scrapers, snow plows and various other accessory equipment applicable to road building work. In addition there will be the Standard 1½-ton

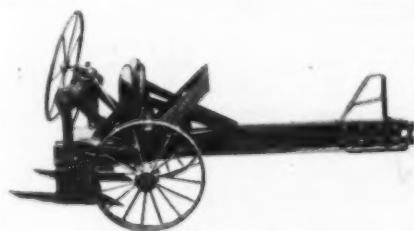


1½-ton Standard Dodge Truck

Dodge truck display consisting of 3-ton 195 in. drop-frame chassis—one with furniture van body and one with six wheel equipment.

Dukelow Hardpan Plow to Be Shown

The Dukelow hardpan plow, a new machine for plowing macadam, hardpan, etc., will be shown at the Road Show. This plow will plow 4 ft. wide and 15 in. deep. The depth is regulated by a handwheel on the back of the plow. When the plow is in the ground the wheels idle or float ahead; thus slopes can be plowed without interference from the wheels. The plow weighs 3,000 lb. Points



Dukelow Hardpan Plow

for the plow are interchangeable. The plow is manufactured by the Dukelow Hardpan Plow Co., Joplin, Mo.

Dow Chemical Co.

The exhibit of the Dow Chemical Co., Midland, Mich., will show in detail the standard methods of using Dowflake calcium chloride, both as an admixture in portland cement concrete for uniform curing and set acceleration and for the bonding and dustproofing of gravel or similar

roads. Particular attention will be given to the demonstration of the advantages in using Dowflake for both summer and winter maintenance work. The effectiveness of Dowflake as an ice remover will be of exceptional interest to all road officials.

Dowflake has been accepted by many engineers and contractors as a necessity in building construction or in paving work due to the ease and low cost of obtaining high early strength and uniform and positive curing. This early strength is particularly advantageous in cold-weather construction since it reduces considerably the freezing hazard.

Pictures will be on hand to give complete information on the 1931 recommendations regarding the method of curing concrete slabs; also specifications applying to the use of calcium chloride to eliminate dusty gravel roads. Don Williams, assistant sales manager, will be in charge.

Electric Wheel Co. Exhibit

The Electric Wheel Co., Quincy, Ill., will exhibit for the first time two models of its Dreadnaught



Dreadnaught Crawler Wagon

crawler dump wagons. The company also will show a complete line of steel, solid rubber and pneumatic tired tractor, agricultural and industrial wheels.

The Dreadnaught wagons have a capacity of 6¼ yd. water level measure or 7½ yd. heaped measure for the grader wagon; for the shovel wagon the capacities are 7¼ yd. water level measure or 8½ yd. heaped measure. The special features claimed for these wagons are:

Rigid drawbar makes backing easy. Rear hitch for train operation standard equipment. Wagons trail closely with tractor when hauled in train. Light draft inherent in Dreadnaught wheel design. Arched drawbar permits cut under and short turning. Elevating grader wagon with low side quickly converted for shovel loading by addition of steel side and end boards. 27½ unobstructed clearance under center axle and frame permits free dumping and easy get away.

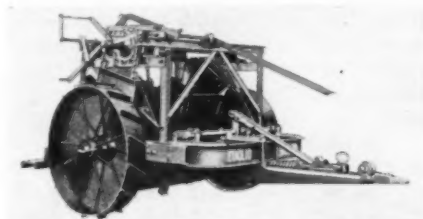
Etnyre Distributor Will Be Displayed

E. D. Etnyre & Co., Inc., Oregon, Ill., will occupy booth B-31A and will exhibit their 850-gal. Model F distributor mounted on a Hug Model C-87 chassis. Those in attendance in connection with the exhibit will be J. L. Long, of Chicago; Geo. E. Pearson, of Boston; E. D. Etnyre, president; R. D. Etnyre and Geo. M. Etnyre.

Euclid Crane & Hoist Co. Exhibit

The Euclid Cranes & Hoist Co., Cleveland, O., will have on exhibit at booth A-49, the following equipment:

New Euclid Track-wheel hydraulic bottom dump wagon, New Euclid



Euclid Automatic Wheel Scraper

Track-Wheel gravity dump wagon, New Euclid hydraulic rotary scraper, New Euclid hydraulic bulldozer on Caterpillar sixty tractor, New Euclid Track-Wheel track or belt.

A working model of this new Track-Wheel showing cut-away of all moving parts will be on exhibit.

Everhot Exhibits Branding Equipment

Everhot Manufacturing Co., Maywood, Ill., will exhibit in booth B-10 its complete line of branding equipment. Its representatives will be Edward Leight and A. C. Flothow.

Fafnir Will Exhibit Complete Line of Bearings

In the annual Road Show to be held this year in St. Louis, the Fafnir Bearing Co., New Britain, Conn., will exhibit a complete line of the various popular types and sizes of ball bearings used in the contracting and highway field, with particular application to road-building machinery. This includes, of course, both single and double-row types, maximum-capacity bearings which, with their large number of large-size balls in conjunction with the Fafnir deep-race design, enable extraordinary high loads—

both radial and thrust—to be absorbed readily.

Typical bearings such as used in the products of Bucyrus-Erie, Northwest Engineering Co., Barber-Greene, Caterpillar tractor, Koehring, Ames, Osgood, and other leading manufacturers, will likewise be on display.

Federal to Exhibit 4 Trucks

The display of the Federal Motor Truck Co., Detroit, Mich., will consist of the following:

A model D, 1½-ton chassis with



Federal Model A6, 2-Ton Chassis and Standard Cab with 2-Yard Dump Body

1½-yd. dump body; a model A6, 2-ton chassis with 2-yd. dump body; a model T1B3, 2½-3-ton chassis with 3-yd. dump body; a model 4C6A, 4-5-ton chassis.

Flintkote Roads, Inc., Exhibit

The Flintkote Roads, Inc., New York City, exhibit will feature airport construction and will show photographs of airports upon which Colas has been used during the past year. The exhibit will also have illustrations of roads and driveways which have been built in this country and a small display of a road being penetrated with Colas and all the equipment incidental to this construction.

L. M. Stanhope will be in charge of the exhibit and it will also be attended by Col. H. L. Bowlby, general manager of the company; V. L. Ostrander, district engineer, F. J. Murray, sales engineer, and others.

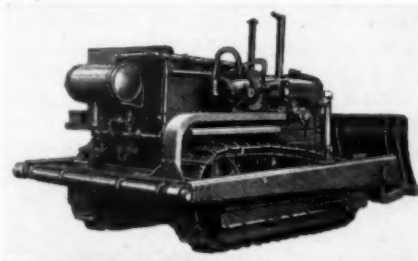
Foote Bros. Will Show Bates and Stockland Equipment

Foote Bros. Gear & Machine Co., Chicago, Ill., will have on display in their booths A-10 and A-21, a representative line of Bates tractors and Stockland graders in various sizes and with their auxiliary equipment. The display consists of the following items: One 80-12 straight-wheel grader, one 35-8 leaning-wheel grader, one No. 2 Whippet.

These graders can be furnished in various sizes and models as follows: 80-12, 50-10, 35-8 and 40, either in

the straight-wheel or leaning-wheel type; in the maintainer line, Whippet No. 1, 2 and 2A, as well as Greyhound and the smaller 20 and 30 horse-drawn graders.

In the Tractor line, of Bates display, Model 80 tractor, equipped with



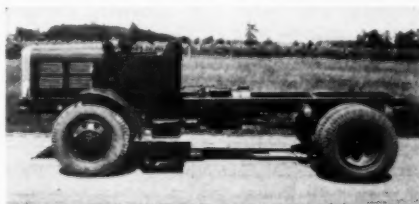
In Exhibit of Foote Bros. Gear & Machine Co.

snow remover, a standard model 45 tractor and the Model 35 tractor, equipped with new Bates bulldozer.

The following men will be in attendance at the booths, and represent this Bates and Stockland equipment: W. C. Davis, president; H. H. Bates, vice-president and sales manager; W. O. Bates, Jr., promotion manager; F. P. Callahan, vice-president; W. A. Barr, vice-president; J. P. O'Hare, assistant sales manager, and various other local and state representatives from other territories.

FWD Will Exhibit Two Trucks

Highway commissioners and engineers and general contractors who attend the Road Show will find some interesting exhibits in the booth of the FourWheel Drive Auto Co., Clintonville, Wis. This concern will occupy space B-23 in exposition building B, and will have on exhibit



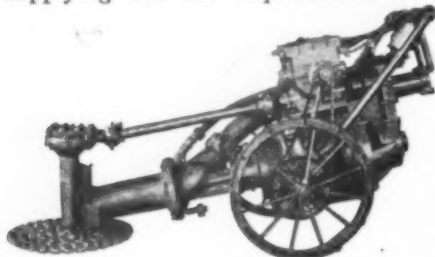
An FWD Chassis

their Model CU6, of 3½-ton capacity, body-end-hoist mounted, and Model M7, of 7½-ton capacity.

Model CU6 is one of the more popular sizes for highway work, both in construction and in maintenance. It has been particularly popular in the work of snow removal. The M7, an adaptation of the 5-ton unit built for the U. S. Army Quartermaster Corps, is particularly well qualified for combination body-and-trailer hauling.

Fuller Co. Shows Pumps for Unloading Bulk Cement

The Fuller Co., Catasauqua, Pa., will exhibit two types of Fuller-Kinyon portable unloading pumps, for handling bulk cement, asphalt filler and similar pulverized materials. The operation of these machines will be clearly illustrated by motion pictures. The company will exhibit a small, single-stage rotary air compressor, especially suitable for supplying the air requirements of



Self Propelled Portable Unloading Pump

these pumps and other tools used in highway and construction work. It will also exhibit its 14 in. rotary bin gate, or discharge valve. The booth will be in charge of George K. Engelhart and Jose M. Alonso, the engineer in charge of the Chicago office.

The new machine is the self-propelled type of Fuller-Kinyon portable unloading pump. The other machine is quite similar to the one exhibited last year at the Road Show for the first time, and which was then kept somewhat in the background, as it had not yet tested the unit thoroughly in commercial service. Within the past season, both machines have been severely tested, both on bulk cement and asphalt filler.

The small machine has a capacity up to 90 bbl. per hour average, this including the time for spotting cars, opening doors, etc. The larger machine is capable of equivalent service for capacities up to 150 bbl. per hour, but it should be understood that its actual delivery rate is greatly in excess—namely approximately 200 to 230 bbl. per hour, when operated by a skilled operator.

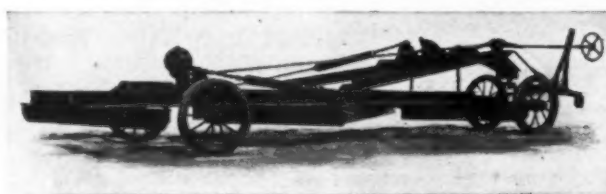
The large machine is driven by a built-in motor, provided with a power take-off and a system of clutches for driving the supporting wheels. Independent controls permit the operator to move either wheel in either direction to force the machine and its feeder into the material to be conveyed; and this is accomplished substantially without physical effort. This machine can readily be handled by one man who can not only operate the machine, but take care of unloading and delivery of cement to the

proper bin or bins. It conveys through a 4 in. rubber hose, connected to a black steel transport line leading to the various points of delivery. The flow of cement to the various bins is under the control of two or three-way diverting valves.

These pumps are similar in operation to the standard type of Fuller-Kinyon pump, used throughout the cement industry as standard practice for conveying cement. The only difference is that they are portable and are driven from the discharge rather than the inlet end.

Galion Exhibit to Be a Large One

The Galion Iron Works & Mfg. Co., of Galion, Ohio, will exhibit the following equipment at the Road Show: No. 12 heavy-duty E-Z Lift leaning-wheel grader, No. 70 E-Z Lift leaning-wheel grader, No. 8 multiple blade maintainer, 10-ton Master roller with scarifier, 7-ton Little Master roller with scarifier, stone spreader, McCormick-Deering motor



New Galion No. 8 Multiple Blade Maintainer

patrol grader with Sure-Trac rubber crawlers, cab and independently-operated scarifier. Many new features of operation and construction in Galion equipment will be of interest to every road man. Three new machines, developed during the past year, which will be exhibited, are described below.

The new Galion No. 70 leaning-wheel grader is the smallest in the Galion line of leaning-wheel graders which is offered for general service. This machine, having a 7-ft. mold-board, and weighing less than 4,000 lb., embodies all of the exclusive Galion features found on the larger Galion graders. It is designed for light-tractor or horse operation.

The new Galion No. 8 multiple blade maintainer, a machine of recent development, has already won approval for its work on earth, gravel, stone and retread work. There are seven blades, six stationary and one rear adjustable blade, which serve to cut off high places and fill the holes, leaving a smooth, accurately graded road. Complete control of the machine is from the

tractor or power unit, by means of a triple-action gear shift, operated by the handwheel shown in the foreground of the illustration.

One of the outstanding developments in motor patrol graders during the past year was the Galion Sure-Trac rubber crawler, which claims many advantages, such as long life, smooth operation and positive traction under any working condition.

Gears and Forgings Exhibit

Gears & Forgings, Inc., Cleveland, O., will exhibit the following equipments: Gears, forgings, tractor transmissions, truck auxiliary transmissions and speed reducers.

General Motors Truck Exhibit

Exemplifying modern developments that contribute materially to lower truck expense and increased profits for road builders, representative models in the General Motors truck line, specially equipped for

road construction and maintenance, will be on view at the Road Show.

A highlight of the show will be the exhibit of the General Motors truck, Model T-90A special, for heaviest duty. It is one of a number of basic models in the General Motors truck line for 1931. This model has a 165¼-in. wheelbase. It is equipped with underbody hoist and power take-off with dump body of 5-cu. yd. capacity, size 11x6 ft., and with snow plow.

The Model T-90 now has as standard equipment a four-speed main with auxiliary transmission permitting under and over drive, providing a total of twelve speeds forward and three speeds in reverse. The engine now has also as standard equipment, special alloy aluminum pistons, downdraft carburetion, improved cylinder head, tulip-type valves with lighter valve springs, a larger water pump, improved manifold, higher oil pressure, improved oil filter, single-slot oil-control piston ring and heavy-duty triplex air cleaner.

Another General Motors truck

unit for heavy duty, a Model T-60B, with Brown-Lipe auxiliary transmission and Deluxe cab, will be on view at the show. The equipment consists of a three-way hoist and 3-yd. dump body, and electric hydraulic spring road scraper with 10-ft. blade.

To be exhibited also are the Model T-19 (1½-ton range), equipped with 1½-yd. standard dump body with underbody hoist, and a fourth model, the T36C. Equipment on this model consists of compressor driven from power-drive unit by means of multiple V belts, with radiator, air tank and other auxiliaries. Tool boxes are along the left-hand side of the frame and under the rear of the chassis. The unit has a 2-yd. dump body with underbody hoist.

General Wheelbarrow Shows Empire Grader Blades

The General Wheelbarrow Co. will have their Road Show exhibit this year in booth B-116. The exhibit will be devoted entirely to Empire grader blades. Finished blades will be exhibited in various lengths, showing the new state standard punching. These blades will be made of the special Empire grader-blade steel, which is not only unusually high in carbon but also has a high manganese content and other special ingredients. During the past year Empire blades have been used by the following state highway departments: Illinois, Maine, Kansas, Iowa, Kentucky, Arkansas, Ohio, Missouri, Minnesota, Oklahoma, Texas, Massachusetts, Michigan, Washington and Vermont.

The following will be in attendance from this company: W. A. Gordon, sales manager; J. W. Cole, Southern sales representative, and J. M. Rorimer, vice-president.

Godwin Paving Guards

The exhibit of standard products of the W. S. Godwin Co., Baltimore, Md., will show steel paving guards in connection with full-size sections of roads, streets, railroad crossings, street-railway paving, concrete curbs, etc.

A new product, to be on exhibit, is rustless steel facing for curbs. These facings eliminate the more or less continuous painting of curbs around filling stations, etc. They also eliminate the forms used for constructing concrete curbs.

In charge will be W. S. Godwin and J. L. Perkins.

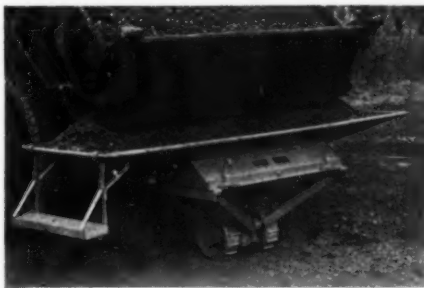
Good Roads to Show Model Crushing Plant

The Good Roads Machinery Co., Inc., Kennett Square, Pa., will exhibit a complete model rock crushing plant built to an exact one-quarter scale and electrically driven. This model plant includes a "Good Roads" Champion primary breaker, also roller bearing reduction crusher, elevator, screens, bins and transmission. This little rock crushing plant is capable of crushing real stone. Working models of other Good Roads equipment also will be on display.

The company's executives and representatives who will be present at the Road Show will include E. S. Philips, vice-president and general manager; R. S. Tucker, assistant general manager; J. W. Kitts, advertising manager; W. D. Polk, sales engineer; E. C. Brown, sales engineer and various other members of the district and home sales offices.

New Type of Goroco to Be Shown

The Goroco Mechanical Spreader Co., Upper Darby P. O., Philadelphia, Pa., again presents, in booth



Goroco Mechanical Spreader in Operating Position

A-71, their separate spreading unit for covering oiled and waterbound surfaces and icy pavements.

This year a new type of machine, having several advantageous features, will be shown. Retaining the principle of centrifugal spread, the machine is now furnished with 8½-ft.-wide hopper designed to accommodate full tail-gate opening on the propelling truck, eliminating the need for alteration to the tail gate as required for the previous model.

The quantity spread per square yard is regulated by a multiple slide-gate opening in the hopper, controlled by a lever within easy reach of the operator. This opening is always self-centered over the spreading disk, assuring uniform distribution at all times of sand or stone in

quantities ranging up to 50 lb. per sq. yd.

Of further interest is the enclosed gear transmission, oil filled, assuring complete lubrication to all working parts. The machine operates on two wheels, steel or rubber tired, as desired. Sturdy construction throughout offers a lasting piece of equipment that will withstand the hard use to be expected in maintenance and construction service.

The new design retains the former advantages in that it is a separate spreading unit, attachable to any make of truck, spreads any loose aggregate from dust to 1¾-in. sizes, requires but two men for operation and has a capacity of 400 tons per day.

The machine, a working model and moving pictures will illustrate the advantages offered. R. E. Eggleston will be in charge of the exhibit, assisted by A. I. Dean and H. N. Bechtel.

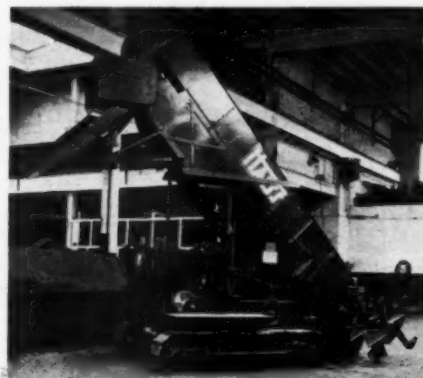
Haiss to Exhibit Latest Type Excavator

The George Haiss Mfg. Co., Inc., New York, N. Y., will exhibit in booth AR-9 its latest type of excavator, which is designed for shallow grading, excavating, underpasses, airport grading and roads.

The Haiss 1931 excavator is equipped with 13-in. wide caterpillars, 9 ft. long overall, giving a bearing pressure for the machine weighing 22,000 lb. or less than 10 lb. per sq. in.

The motor is a Waukesha six-cylinder, 60-hp. and drives the Haiss transmission box which encloses all the gears running in oil. This box is also equipped with a slow speed mechanism which crowds the excavator into the pile at a speed of 4 ft. per minute.

The digging mechanism on the excavator consists of electric steel buckets equipped with renewable steam shovel type teeth, as well as



Haiss 1931 Excavator

the Haiss patented feeding propellers and picks which dig into the material and push it towards the center of the elevator where it is raised by the buckets.

Haiss excavators can be equipped with either swivel spouts which have a discharge radius of 200 deg., or with belt conveyors instead of the swivel spout, which can discharge 11 ft. from the center of the machine, on either side, or forward.

The excavator has a rated capacity of 2 yd. per minute. To keep a grade, the excavator is equipped with a pointer which indicates whether it is above or below grade and by means of a mechanical raising device the elevator can be kept within $\frac{1}{4}$ in. of the desired grade.

This machine is convertible in the sense that it can be used as a loader equipped with batch hoppers for either volume measuring or of the weighing type, also with grizzly screens for scalping gravel and if desired can be equipped with a snow boom for loading snow during the winter.

Hamilton Will Exhibit New Drawing Table

The Hamilton Mfg. Co., Two Rivers, Wis., will have on display at the Road Show a new drafting table which is called the Auto-Shift drawing and reference table. The principal feature is a device that makes the changing of the height of the drawing board simple and rapid.

A lever under the foot-rest is depressed slightly, releasing the brake holding the top. The top is then grasped and raised or lowered with ease (as it is counterbalanced) to the desired height. When the lever is released, the top will remain at whatever height it is placed and will support the weight of an ordinary

man. The slant of the top remains the same as before.

It also has an arrangement for changing the slant of the drawing-board top from horizontal to vertical or any intermediate angle in a very few seconds. There is a rod running across the front under the drawing board and when this is raised the brakes are released holding the top. The top is then tilted to any desired angle. This movement does not interfere in any way with the mechanism which controls the height of the top.

The Auto-Shift drawing table is intended to be used in a row with several similar tables. The reason for this is the feature which gives each draftsman a desk and reference surface under the drawing board to his rear and also a large reference drawer for blue prints, reference materials, etc. This is especially valuable when drafting in a vertical position and also brings into very advantageous use the two-drawer unit. This unit has a tool drawer systematically arranged with a tool tray, ink-bottle holder with space for several bottles and space under the tool tray for miscellaneous supplies. Under the tool drawer is a large letter file or catalog drawer.

The Auto-Shift table is also equipped with an ingenious device for holding instruments, especially when the board is in a vertical position. Any instruments desired, except the triangular scale, may be placed in this instrument holder or removed instantaneously. This is placed on the upper right corner of the drawing board.

This table is designed like a desk and the body of the table is of steel in olive green finish, and striped in gold. The drawing boards are of selected pine and varnished both sides.



Hamilton Auto-Shift Drawing and Reference Table

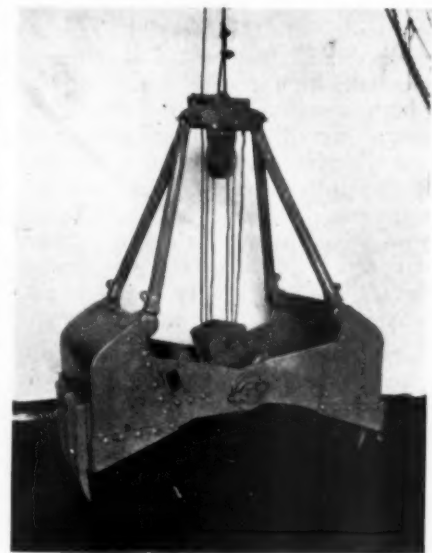
Hastings to Exhibit Asphalt Blocks

The Hastings Pavement Co., New York, N. Y., will occupy Booth A-125 and will exhibit compressed asphalt paving and flooring blocks for the wearing surface of streets, roads, piers, warehouses, loading platforms, factory floors and bridges. Model pavements of asphalt-block non-skid construction; asphalt blocks laid with asphalt joints and asphalt blocks laid on a bituminous cushion on plank decking, samples of asphalt blocks and tiles, and motion picture showing the method of manufacture and installations of asphalt block pavements.

The representatives will be P. L. Thompson, sales manager; T. J. McNally, assistant sales manager; A. E. Cohen, technical advisor.

Hayward Will Show New Chamshell

The accompanying illustration shows Class K digging clam shell bucket, a new development of the



Hayward Class K Digging Clamshell Bucket

Hayward Co., New York, N. Y., in the past year. The bowl of the bucket is of one-piece steel construction, with manganese steel bushings, shoes and teeth and hardened steel shaft and pins. The rods are of extra heavy pipe, the upper and lower ends are steel castings and the whole is electrically welded into one piece.

The Hayward booth number at the Road Show will be AR-20-A and will be in charge of E. J. Robeck, Cleveland representative. H. S. Atkinson, engineer, will also be in at-

tendance. There will be on display models and photographs of Hayward Class E rehandling buckets, Class K digging buckets, standard and multi-power orange-peel buckets and drag-line buckets.

Hazard to Display Wire Rope

The Hazard Wire Rope Co., Wilkes-Barre, Pa., will occupy space B-7. An attractive display of wire rope as applied to road work will be featured.

Headley Exhibit

Headley Emulsified Products Co., Philadelphia, Pa., will occupy booth B-121. The exhibit will consist of literature and photographs.

The Heil Co. to Have Large Exhibit

The Heil Co., Milwaukee, Wis., will display the largest exhibition of its hoist and body equipment ever shown at any previous road show.

The center of attraction of the Heil exhibit will be the new Model 5-26 Heil Hi-Lift unit designed for use with wet mix concrete bodies, coal bodies, etc. The Heil Hi-Lift linkage which is operated by a standard Heil twin cylinder hydraulic hoist, can be assembled at the factory to provide practically any combination of dumping positions to suit customer hauling requirements. The unit on display will have two dumping positions namely the usual straight rear dump and the Hi-Lift position which gives the body an approximate 7 ft. 6 in. tailgate ground clearance and a 40 deg. dumping angle. The Hi-Lift unit will be equipped with a 3-yd. Model 30 Heil body.

The Heil Model 51, 2½ yd. capacity body, with removable sides, will be mounted with a No. 3 Heil twin cylinder hydraulic hoist. With the body sides in place all kinds of loose materials can be hauled and dumped; with the sides removed the body becomes a platform for hauling all kinds of maintenance materials.

A heavy duty Heil dumping unit, will consist of a 3-yd. Model 11 Heil body and a No. 4 Heil twin cylinder hydraulic hoist. The body will be equipped with swinging partitions and offset type tailgate hinges, also a new and interesting type of cement compartments.

The new Heil light duty WB unit also will be shown. This unit consists of a 1½ yd. WB Heil body and No. 1 Heil hydraulic hoist and marks The Heil Co.'s active entry

into the light duty hydraulic hoist and body field with a unit priced in line with the price of light duty chasses. The No. 1 Heil Hoist is not an undersized hoist but has all the power and operating speed necessary for dumping any load that can be hauled on the light duty unit for which it is recommended.

Each of these Heil exhibit units will be mounted on stands and operated by electric motors so that Heil construction and operating features can be readily demonstrated and explained.

Another feature of the Heil exhibit that should prove interesting will be a comprehensive photographic display of Heil hoist and body installations.

Heil branch managers and Heil Milwaukee factory executives will be in attendance at the Heil exhibit throughout the show week. Julius P. Heil, president of the Heil Co., will spend one or two days at the show.

Heltzel Exhibits Complete Line

The Heltzel Steel Form & Iron Co., Warren, O., will occupy booth AR-12, where it will exhibit its complete line of concrete road building equipment. A 3-compartment portable storage bin equipped with a 3-compartment weighing batcher which has a very novel arrangement for operating the charging and discharge gates will be shown. The automatic springless dial scale will be used in connection with this installation. A complete line of steel forms for the construction of concrete roads, city streets, curb and gutter and sidewalk also will be on exhibit and the latest improved flexible joint machine will be displayed under actual working conditions.

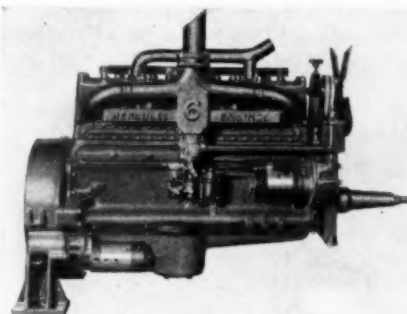
There will also be numerous small tools such as aluminum jointing tools, straight edges, floats, etc.

It is anticipated that the following representatives will attend the exhibition: J. N. Heltzel, president and treasurer; J. Wm. Heltzel, assistant general manager; B. M. Clark, sales manager; R. R. McBride, chief engineer; W. A. Flick, traffic manager; O. W. Davis, field representative; T. M. Bentley, field representative.

Hercules Exhibits Representative Line at Show

Following its usual custom the Hercules Motors Corp., of Canton, Ohio., manufacturers of heavy-duty engines, is showing an extensive and representative group of models at

the Road Show. Among the models shown are 4-cylinder and 6-cylinder engines and power units designed especially for use on specialized road building machinery, as well as similar models developed for commercial-vehicle application. These engines cover a wide range of size.



Hercules HX Series of Six-Cylinder Engines Will Be Shown

Of particular interest in the Hercules exhibit is the Model HXC six-cylinder 5¼x6-in. industrial power unit shown as a complete open-type power unit including radiator, all accessories and clutch power take-off. Another interesting model is the Hercules HXD, 5½x6-in., which is typical of the larger series of heavy-duty six-cylinder engines. This model is shown with leg-type bell-housing and center outlet exhaust, but it can, of course, be arranged to meet any individual specifications. Among the other engines and power units exhibited are individual models of the OO, L and TX four-cylinder series and the YX and WX six-cylinder series of Hercules engines. A complete line of parts for the various models shown is also displayed.

Hercules occupies space B-1 in exhibition building B at St. Louis, and the executives of the company will make their headquarters at the Hotel Jefferson. The exhibit is in charge of Clyde Schuler. Others in attendance from the Hercules factory are Charles Balough, D. W. Latta, John Keplinger, Lon R. Smith, Charles P. Weekes, Walter Radtke, George Earle, A. B. Wehling, R. J. Scott, John Carnahan and G. C. Eldredge.

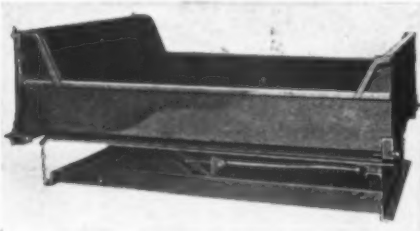
Hercules Exhibits New Engine and New Dump Body

The Hercules Products, Inc., Evansville, Ind., will exhibit in booth B-86 its new enclosed engines and in booth B-11 its hydraulic rotary and automatic dump body. A new rotary dump body is made in three sizes, 1 cu. yd. to 2½ cu. yd. capacity, for 1 to 2-ton chassis. The body is made of 10-gauge sheet steel, one-piece

construction, heavily reinforced with angles, channels and tie rods, electrically welded throughout.

It is stated that it can be raised or lowered smoothly and quietly in eight seconds. It has dual control and can be stopped at any angle going up or coming down by the power take-off lever or the main clutch.

The new Model J enclosed engines are built in two sizes, 2 h.p and 3½



Hercules Rotary Dump Body

hp. The first mentioned weighs 175 lb., and the other weighs 331 lb. The carburetor is of the positive suction feed type with an automatic air intake. The engine is equipped with the Wico high tension magneto which is tripped by a push rod operating from an eccentric on the cam shaft. All the mechanical parts requiring lubrication are operated in a bath of oil inside the crank case.

Hercules Will Show New Road Rollers

The Hercules Co., Marion, Ohio, will introduce a new line of road rollers, comprising Models 60, 80, 100, 120 and 150, at the Road Show.



A New Line of Hercules Rollers Will Be Shown

These models offer a complete range of rollers of the three-wheel type from 6 to 15 tons. Details and specifications of the new line will be available at the show, at which the Hercules Co. will occupy space B-51.

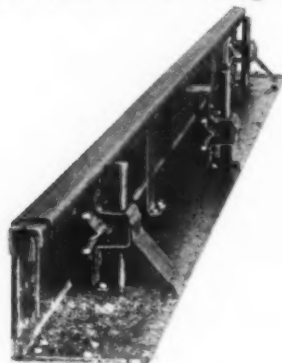
Highland to Exhibit New Cabs

The Highland Body Mfg. Co., Cincinnati, O., will occupy space B-170. The exhibit will be in charge

of Sam Froome. Wm. Morrison and O. W. Rasmussen will also attend. A feature of the Highland display will be the new Highland all-steel cab designed especially for use of road builders; also the new Highland sleeper cab.

Hotchkiss to Show New Road Form

The Hotchkiss Steel Products Co., Inc., Binghamton, N. Y., will have an exhibit in booth B-134, featuring a road form of new design which



Hotchkiss Road Form of New Design

will appeal to the contractor, as it will allow him to hold his form true to line against the action of the finishing machine. It will be noticed in the illustration that the stake pockets are not in line; this feature will give the form a greater ground-gripping strength.

This company will also show a line of sidewalk, curb, curb and gutter and post forms; also other forms that will be of interest to the contractor.

H. A. Speh, president; M. G. Schneider, vice-president, and E. T. Harrold, sales manager of this company, will be in attendance.

Highway Trailer Will Feature Scraper

The Highway Trailer Co., Edgerton, Wis., will exhibit at the Road Show, their Highway Trailer scraper, operated in connection with Caterpillar tractors. This scraper combines several operations and is operated by one man. It is made in capacities of 2, 3½ and 5½ cu. yd.



Caterpillar-Operated Highway Trailer Scraper

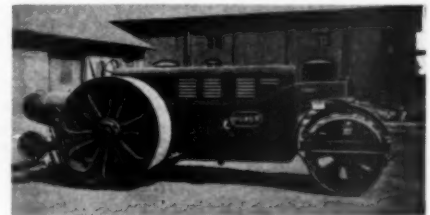
The tractor-scraper outfit can turn in a 20-ft. circle. The universal joint allows turning at an angle of 110 deg. with the scraper attached to the tractor and still receiving power. The scraper pan is carried on the axle in a channel steel frame, supported by two wheels and hooked to the tractor by a drawbar and pin. Power is taken from the rear of the tractor and carried to the scraper-transmission by a compound universal joint and drive shaft. Two levers control distribution of power to the rakers by sprockets and chains, and to the raising and lowering of the pan by steel cables winding in sheaves.

In starting, the pan is lowered to the desired depth and the rakers pull the dirt back from the bit, rising with the dirt as the pan continues to fill. When full, the pan is up-ended and wheeled any distance. Pulling a rope releases the latch of the dumping door, the door leveling the load to any suitable lift in passing over it. The driver does not leave his seat while these operations are going on.

All wearing parts are manganese steel, making greasing unnecessary and practically eliminating wear.

Huber to Show New Roller

The Huber Manufacturing Co., Marion, O., will show for the first time a new 8-ton motor roller, which it has produced to round out its line.



Huber Roller

This makes the line complete in sizes—5, 6, 7, 8, 9, 10 and 12-ton. This new job, like all other Huber rollers, is equipped with Waukesha motor. The design throughout follows right along the lines of the Huber former models—the gears are all enclosed, running in an oil bath—the job is well built and nicely finished.

Hug to Exhibit Its Trucks and Equipment

The Hug Co., Highland, Ill., will have a complete exhibit of its specialized roadbuilding trucks and roadbuilders equipment. The exhibit will consist of a complete line of up-to-date roadbuilding transportation

equipment, including trucks especially designed for single batch, double batch, excavation and dirt moving work and for the transportation of ready mixed concrete. Several new features of design will also be introduced and exhibited for the first time at the 1931 Road Show. The exhibit will include the follow-



Hug Roadbuilder Truck

ing equipment: Model 60 Hug Roadbuilder, Model 85-D Hug Roadbuilder, Model 87M Hug Roadbuilder, Model 67 Hug Roadbuilder, Model 87M with special Trucktor Unit and Model 97-6 Hug Roadbuilder.

In addition to the specialized heavy duty roadbuilder models the Hug Co. will also exhibit one of its commercial designated as Model 23. This truck is designed for light dump truck work and is rated as a 2-ton truck with a maximum load capacity of 6500 lb.

The new feature to be exhibited by the Hug Co. will be the Hug Rocker arm spring equalizer. This is a special attachment designed by C. J. Hug to equalize the strains and stresses on the chassis frame and to prevent distortion of the frame when working under the severe conditions encountered in the roadbuilding and dirt moving field. The rocker arm spring suspension gives a 3-point suspension of the chassis frame over the front axle and eliminates all twisting and straining of frame members due to uneven conditions of the road. The rocker arm is suspended directly beneath the center of the truck frame, the two ends being connected to the front spring by a special shackle arrangement. In the conventional spring hookup the end of the spring is shackled to the frame, transferring all road shock to the frame. The three point rocker arm spring equalizer is pivoted in the center of the truck frame between the rear ends of the front springs, and the springs and shackles absorb the shock, distortion or strain which otherwise would be transmitted to the frame through the front axle. This pivoted beam permits the front spring to move up or down as the case may be.

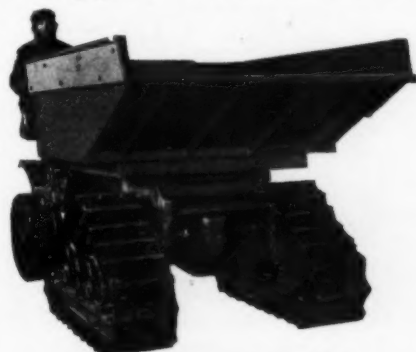
In addition to the complete line of roadbuilding transportation equipment, the Hug Co. will also exhibit the Hug subgrade template, a specially designed template to indicate the high or low spots in the subgrade. This template is furnished in any width up to 23 ft. The Hug subgrading machine will also be on exhibit. This machine trims the subgrade true to specification and eliminates any guess work as to proper subgrade design. The machine is furnished in any width up to 23 ft. In addition to these two units, the Hug turntable will also be displayed. The Hug turntable is available in two capacities,—the 9,000 lb. capacity and the 15,000 lb. capacity. These turntables are designed for single and dual rear tire trucks and increase the efficiency of handling material on the subgrade.

The Hug exhibit will be in the west wing of the Arena, space B-35.

Three Hughes-Keenan Products on Display

The Hughes-Keenan Co., of Mansfield, Ohio, is showing the following equipment at booth 18, exhibition building B, at the St. Louis Road Show: The 4-yd. Iron Mule mounted on the McCormick-Deering industrial tractor Model 20, a Roustabout crane and the latest model heavy-duty hydraulic-hoist dump body. Hughes-Keenan men in attendance will be Arthur S. Hughes, W. E. Post, Herman W. Schaller, J. D. Corrigan, E. F. Murray and A. T. Reynolds.

The Hughes-Keenan Iron Mule is a 2 or 4-yd. dump body with complete dumping mechanism mounted on either McCormick-Deering industrial tractor Model 20 or the Allis-Chalmers Model U industrial tractor, ready for service when shipped. Either size is a complete dumping unit primarily for hauls of 500 to 600 ft. The direction of tractor drive is reversed by reversing the rear-axle driving gears. The driver's seat and



Hughes-Keenan Iron Mule

operating mechanism are changed so that he faces the load and the new direction in which the tractor runs. The driver has a clear view at all times over and around the load, allowing him easily and quickly to spot the Iron Mule under shovel or dragline for loading and dumping. The Iron Mule goes up or down steep grades, operates in rough ground and mud and hauls big daily yardages. In the 2-yd. size, reversing the drive gears causes the large rear drive wheels to pull the load instead of pushing it. In the 4-yd. size the crawler tracks pull the load.

The Roustabout is an all-purpose crane, mounted on various standard industrial tractors. It handles all kinds of material, sets posts and dies, lays sewer or water pipe, handles flasks and castings, loads and unloads cars and accounts for a whole host of miscellaneous but important transportation duties. Outstanding features are as follows: rated capacity, 2,000 lb., with horizontal boom and full swing; boom swings through complete circle in either direction; ballbearing turntable for easy operation; boom and load are raised and lowered separately, all power-operated; passes through door opening 5 ft. 8 in. wide by 7 ft. 9 in. high with ample clearance; all control levers within easy reach of operator; furnished, complete, mounted on tractor.

The heavy-duty hydraulic hoist is a powerful, speedy, fool-proof hoist of the underbody type. It is designed for use with dump, coal and garbage bodies, and for standard stake or platform bodies to convert them into dumping units. This hoist has a horizontal cylinder of 5-in. inside diameter and a special type of link-connected lifting arms designed so the lifting power of the hoist is applied to the body in the most advantageous manner. A rigid structural steel frame supports the hoist. The body mounting is unusually low, and yet the rear-end dumping clearance is very high. The hoist is supplied as a completely assembled unit ready to drop in place on the truck. All mounting parts are furnished, including power take-off.

Hvass Products Will Be Displayed

The exhibit of Chas. Hvass & Co., Inc., New York, N. Y., at the Road Show will include the following Hvass products: distributor on motor truck, bituminous auxiliary tank trailer, heavy-duty transport trailer and spreader attachment for

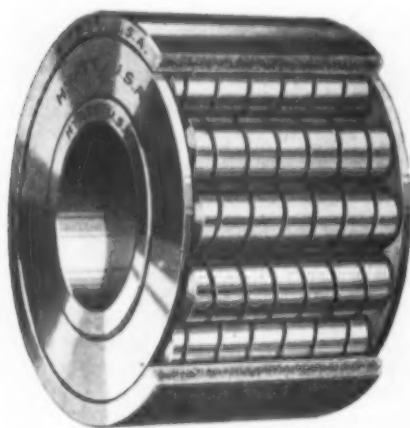


Hvass Distributor, to Be Seen at Road Show

dump truck. The accompanying illustration shows the Hvass distributor that will be exhibited.

Hyatt Bearings to Show

The Hyatt Roller Bearing Co., Harrison, N. J., will exhibit Hyatt roller bearings of various types suitable for application to contractors' equipment; also designs and



Hyatt Will Show Bearings

panels illustrating actual applications. Their booth number is B-66. The exhibit will be in charge of C. L. Newby, manager western division. T. A. Russell and H. G. Wilson, both of the western division, will also be in attendance.

Independent Pneumatic to Show Thor Products

The Independent Pneumatic Tool Co., Chicago, Ill., will occupy booth B-52, building B, exhibiting Thor air compressors, rock drills and contractors' tools.

The 220-cu. ft. Thor air compressor will be shown, mounted on a heavy-duty steel-wheel trailer. The Thor is the only compressor equipped with a supercharger. The unit type of design of the Thor eliminates bulkiness and reduces upkeep costs. Both engine and compressor are mounted on one

crankcase, doing away with clutches, couplings and gears.

The Thor clay digger will be shown and its design is interesting because it is of the valveless type, the piston forming the valve. The Thor Cochise rock drill will be included in the exhibit this year, since the Independent Pneumatic Tool Co. purchased the Cochise Rock Drill Mfg. Co. in June, 1930.

The personnel in attendance at the Thor exhibit will include R. S. Cooper, president; M. J. Harkless, F. J. Passino, H. E. Linney and C. H. Carl.

Ingersoll-Rand Shows New Small Compressor

Ingersoll-Rand Co., 11 Broadway, New York, will exhibit the following equipment:

X-71 drifter type rock drill on Type D wagon mounting; Type 20, 10x8 portable compressor on rubber-tired wheels; Type 20, 5½ x5 portable compressor on steel wheels; cross-sectional assembly of the free air unloader used on Type 20 portable compressors; Type 30 air-cooled portable compressor of 30 c.f.m. piston displacement; No. 50 drill steel sharpener; complete display of jackhammers, paving breakers, and pile drivers; complete line of pneumatic tools applicable to road and bridge work.

The Type 30 portable compressor is being shown for the first time. It will operate one or two pneumatic tools and is designed to furnish air for such services as grinding, chipping, scaling, concrete surfacing, paint spraying and the like. It consists of a 2-stage, air-cooled ball-bearing compressor driven through V-belt from a Fuller-Johnson 4-cylinder, 4-cycle, ball-bearing gasoline engine. It is equipped with air cleaners, automatic unloader and governor, a 16x40 A.S.M.E. air receiver, and a 12-gal. gasoline tank which will hold enough fuel for a day's con-



Type 30 Portable Compressor

tinuous operation. The unit is mounted on steel wheels and enclosed within a housing which has removable side covers.

The Ingersoll-Rand exhibit will occupy booths B-54 and B-69, located in the central portion of exhibition building B.

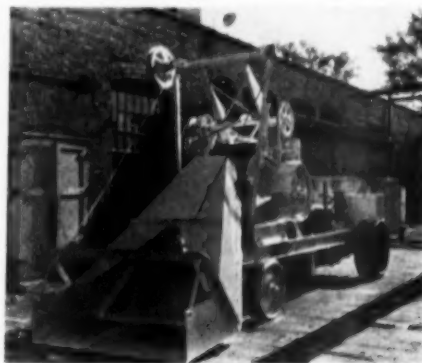
The exhibit will be in charge of Mr. George Williams, manager of the portable compressor department of the company.

International Harvester Exhibit

The International Harvester Co., Chicago, Ill., will occupy space A-16, in exhibit building A. The exhibit will consist of five motor trucks equipped with hoist and dump bodies, especially adapted for road building, and one cutout motor truck chassis, electrically operated. There will be three industrial tractors and two power units; also one cutout industrial tractor electrically operated. The motor truck display will be in charge of G. B. Abbott, and the industrial tractor exhibit in charge of W. M. Parrish.

Iowa Mfg. Co. to Show Tractor Mounted Crusher

The exhibit of the Iowa Manufacturing Co., Cedar Rapids, Ia., will be located in spaces A-34 and A-39. In addition there will be an



Tractor Mounted Crusher

outside exhibit of a portable crushing outfit, and the bituminous road mixer. This latter machine picks up a windrow of material from the road and scientifically and accurately batches it with tarvia, asphalt, etc., and puts it back on the road thoroughly mixed. The machine runs down the road on its own power and has four different speeds and the bituminous binder is kept at a certain temperature by means of a kerosene burner. The

accurate aggregate and oil batchers work together.

The inside exhibit consists of crushers, one of these being tractor mounted. The illustration shows the Allis-Chalmers tractor with a Cedar Rapids 916 crusher mounted and a front loading skip, power driven, for crushing scattered sources of supply along the road. These units are a real self-propelled crushing plant. It can also be furnished with a 912 or 920 crusher as well as a 916, which is shown. The outfit can be obtained without the front loading skip, which is a hopper for hand feeding. In Kansas a conveyor is used on the front where the men use hand shovels to load on the conveyor.

Irving Iron Works Exhibits Armored Bridge Flooring

The Irving Iron Works Co., Long Island City, N. Y., will exhibit the Irving unified reinforcement and armor for bridge floors. This is an adaptation of Irving steel mesh flooring to the bridge slab problem—combining a bottom system of Irving mesh flooring as a tension member and a top system of the same as a compression member and at the same time a surface armoring for the top of the concrete slab.

Irving continuous armoring for bridge floors and highways also will be exhibited. This is an adaptation of Irving continuous industrial armoring to highway problems. It can be used with concrete slabs, or on top of concrete or wood floors.

New Johnson Weigh Batcher Exhibited

A new multiple-material weigh batcher designed especially for paving contractors will be exhibited by the C. S. Johnson Co., of Champaign, Ill., in space 24 in the arena. The batcher is constructed to handle three aggregates and is divided into three compartments, the

weight of each compartment being controlled by a separate beam which eliminates any adjustment after the beams are once set.

The exhibit will also include the improved Bantam weigh batcher, a new bulk-cement handling cart and standard single-material weigh batchers for sand and stone.

C. S. Johnson, J. C. McLean and K. H. Melzer will represent the company at the show.

Joy Mfg. Co. to Show Moving Pictures

The Joy Manufacturing Co., Franklin, Pa., exhibit will consist of moving pictures, photographs, reprints, etc. The company will not have on display one of its Type PL-2 Joy snow loaders this year, but will make up the exhibit describing this unit in the manner mentioned above.

Killefer to Show Machines New in East

Killefer Manufacturing Corporation, Ltd., Los Angeles, Calif., will occupy space A-48 in the arena and will have on exhibition the following machines:

No. 25 Killefer drainage ma-



Killefer Road Disc

chine, No. 28 Killefer revolving scraper, No. 69 Killefer revolving scraper, No. 8 Killefer road ripper, No. 10A Killefer road ripper, No. 38 Killefer scarifier, No. 1 Killefer five-point road rooter, No. 4 Killefer road disc or planer.

The road disc particularly is new to eastern territory, although some were sold in Missouri during the past year. The No. 1 Killefer road rooter is entirely new to the eastern trade.

Kohler Exhibits Electric Plant

The Kohler Co., Kohler, Wis., will exhibit a self-contained electric plant. This plant, model EH 1½ kw., 110-volt, d.-c., is adapted especially for mounting on sledges, excavators, draglines, dredges, ditchers, pavers and other construction equipment. The unit is compact, measuring only 16x37x35



Kohler EH Electric Plant

in., and a strong sheet metal housing protects its smooth-running four-cylinder engine and direct connected generator from the elements and also encloses a 7-gal. gasoline tank. All controls are on the outside of the hood.

Neither vibration nor a sudden jolt affects the action of a Kohler electric plant. Model EH particularly is strong and can be transported on skids, wagons or trucks over rough, roadless country without damage, making it especially adaptable to the needs of road builders.

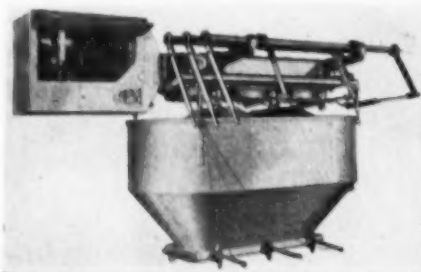
Besides furnishing current for floodlighting, Kohler plants operate such power equipment as motors, pumps, air compressors, lathes, drills and saws. Three different models, one a cut-away type, will be exhibited.

Lakewood Paving Equipment Will Be There

Lakewood road-building equipment will again be seen at the Road Show. It is planned to display the Lakewood graderoooter, the aluminum straightedge, hand finishing belts, the standard steel subgrader, the Lakewood road form with Duo-Rail attachment and the Lakewood Type C finisher. The finisher is shown in the accompanying illustration.



Lakewood Type C Finisher



New Johnson Weigh Batcher

LaBour Pump Will Be Shown in Operation

The LaBour Co., Inc., Elkhart, Ind., will exhibit in booth B-125, and will show a self-priming centrifugal pump in actual operation and fitted with glass suction lines so that the ability of the pump to handle air and prime itself is clearly demonstrated. They will also exhibit models showing the interior of the pump and will exhibit several types of portable gasoline-engine-driven units.

N. A. Pedersen will be at the show during the week and, in addition, St. John Smith, from the St. Louis office, will be in attendance.

LaPlant-Choate Features New Dirt Moving Equipment

The La Plant-Choate Manufacturing Co., Cedar Rapids, Ia., will exhibit the following equipment:

Two roll-over scrapers with Caterpillar 30.

Two bull-scoops on Caterpillar 10.

One backfiller on Caterpillar 30.

One DW-7 wagon.

One DW-8 wagon with Caterpillar 60.

It is planned to put special stress at this road show on the hydraulic rollover scraper and the bull-scoop,



The Bull-Scoop

as both of these are now in production with the company.

The new oscillating backfiller with the cutting edges on each end also is a very recent and late development.

The hydraulic roll-over scraper is a piece of equipment which gives the operator rapid and easy control, either in regulating the depth of cuts taken, or in leveling the dirt when dumping. Dirt may be either leveled when dumping, or may be dumped in heaps. The control is a hand lever mounted on the tractor. This hand lever controls the hydraulic valve. Forward movement of the lever makes the scraper dig in, in back position of

the lever the scraper pulls out and if left in back position, the scraper rolls on back to carrying position. In center position the hand lever holds the scraper in any desired position. When the trip rope is pulled the scraper rolls over, dumping the load in a level layer of any thickness desired. Another pull on the trip rope releases the scraper pan and it returns to the original position.

Lee Transit Mixers Will Show Single Unit

The Lee Transit Mixer Co., Indianapolis, Ind., will exhibit a 1-yd. unit mounted on a Ford chassis.

In the Lee unit, power to rotate the drum is supplied by the truck motor through a power take-off. The drum rotates either forward or in reverse, and can be stopped in any position. In this way, the driver has control of the exact amount of concrete which is dumped.

Charging takes place at the central station, and requires about 30 seconds. A dog snap latch locks the charging door in the drum and seals the charge. At a truck speed of 20 m.p.h., the drum rotates five or six times per minute. If desired, the drum may be rotated with the truck standing still. Correct mixture is assured by finger blades set at proper angles. Dumping takes about 10 seconds. Gravity does the work. When the door is at the bottom, the entire contents of the drum will be discharged. The drum is filleted inside, so there is no possibility of any of the mixture being left there to make trouble. When the driver wishes to dump part of the contents only, he lets the drum turn to a point somewhat higher.



Lee Transit Mixer on an Indianapolis, Ind., Street-Paving Job

Leschen Will Demonstrate Wire-Rope Tests

The exhibit of A. Leschen & Sons Rope Co., St. Louis, Mo., at the 1931 Road Show will consist chiefly of samples of the various types of wire rope which they make for use on road-building equipment. They will also have motion pictures showing the methods of manufacture. Furthermore, they will have in operation some of their testing machines which will show some of the various tests made on wire before it is accepted.

The Linde Air Products Co. Exhibit

The Linde Air Products Co., New York, N. Y., will display the following products in Booth A-115:

Prest-O-Lite floodlight attachments which make Prest-O-Lite dissolved acetylene available for floodlighting. The Oxweld Type W-17 welding blowpipe and cutting attachment, the Oxweld Type R-43 oxygen welding regulator, and portable oxy-acetylene welding and cutting outfits useful in the maintenance and repair of road-building machinery. Prest-O-Lite headlights for road machinery, tractors, trucks and snow plows. Carbic portable floodlights for night construction work. The new Prest-O-Lite primer for starting truck and tractor gasoline engines. The Oxweld portable tensile testing machine and a new bend-test machine, which will be operated to demonstrate the strength and ductility of oxy-acetylene welded joints. Specimens of steel welds and of bronze welds in cast iron. Haynes stellite applications to scrapers, dipper teeth, and other parts exposed to abrasive wear.

Linn Manufacturing Corp. to Show Tractor

The Linn Manufacturing Corporation, Morris, N. Y., will exhibit at Booth A-106 one Linn tractor completely equipped with 100 hp. motor, hydraulic hoist and dump body. The tractor will be equipped



Linn Tractor

with a special high speed reversing transmission, which will enable it to operate at four different speeds in reverse gear corresponding to its four forward rates. The maximum speed forward will be 7.15 miles per hour; the maximum speed in reverse will be 6.74 miles per hour. This device enables the Linn to operate in narrow and difficult cuts and fills without the necessity of turning around and thereby losing time and hence yardage. The value of this special feature is readily apparent, for the Linn can back toward or away from the dump or the shovel, always in high speed, with or without payload.

Littleford Shows Asphalt Kettle for High Speed Trailing

The exhibit of Littleford Bros., Cincinnati, O., will have an asphalt kettle equipped with Timken roller bearings and pneumatic tires, which it is claimed can be trailed 30 or 35 miles an hour, and not only that—the oil burner that heats the asphalt can be kept in opera-

tion while the kettle is being trailed. Asphalt can be melted on the way to the job.

Other outfits displayed are: The Trail-O-Heater, a 300-gal. asphalt kettle; a motor driven emulsion sprayer; concrete heaters with Universal attachment for tilting and non-tilting drum mixers; the heavy duty all-steel tool box for highway departments and contractors; the No. 90 combination tool heater and A. C. kettle.

The Littleford Bros. display, Booth B-43, is under the charge of L. W. Glaser, sales manager.

Lone Star Cement Co.

The Lone Star Cement Co. of Indiana, subsidiary of International Cement Company, will have its headquarters at Booth AR-10A, in charge of Mr. J. W. Hooper.

Variety of Macleod Products at Show

The Macleod Co., Cincinnati, Ohio, will exhibit at the Road Show in space B-38. They will show a number of different sizes of oil-burning tar and asphalt kettles, including one of their latest improved designs in a large size. They will also exhibit a tool heater, a concrete-mixer heater, several small portable oil burners, a sand-blast machine, a paint-sprayer and, if completed, a highway weed mower.

Improved Devices for Highway Guard-Cable Installations

The Road Show exhibit of the Malleable Iron Fittings Co., Branford, Conn., will consist of at least two set-ups of typical compression-spring anchorages for highway guard cables, with cables attached

to two or more posts using the pillow-block units manufactured by this company. In addition there will be present various units for alternative set-ups, including adapters for using the compression-spring anchorage on existing anchor rods.

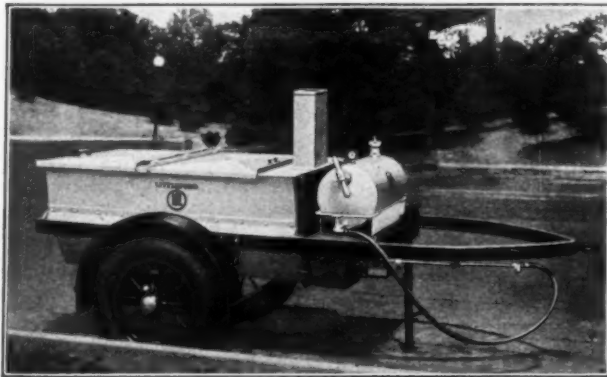
Development of these devices was suggested by the varying sags of highway guard cables resulting from expansion and contraction from season to season. Assuming that the cables are clamped up under desired tension in the heat of summer, slacking-off of the cables is necessary to compensate for the contraction in winter—or else the poles are pulled out of line, or the anchors disturbed by the greatly increased strain resulting from the contraction. The reverse is true if the cables are clamped up to the



Compression-Spring Anchorage Shown in Relation to End-Post

required tension in the cold weather.

The compression-spring anchorage, illustrated herewith, compensates for changes in the length of the cables with only relatively slight variations in the tension on the cables. A double-thimble strain block, to which the cable ends are clipped, slides on the anchor rod and the compression of the spring balances the tension of the cables at all times, until the spring is fully compressed. One type of spring is rated at 880 lb., fully compressed, and another at 1,650 lb. The use of this compression-spring anchorage provides a neat, businesslike installation with taut cables at all season and without maintenance for slacking-off and pulling-up on cables. This unit also acts as a shock-absorber, up to the limit of its capacity when a car hits the fence. If even tensions are required, closer to a standard than the varying compression of the spring will give, then the compression of the spring may be varied without changing



Asphalt Equipment with Pneumatic Tires

the cables, merely by turning the nut at the upper end of the spring.

The next problem is to attach the cables to the posts, firmly yet free to slip so as to transmit strains from cars out of control, etc., to the anchors at either end. An offset pillow-block unit with special shoulder-type J-bolt operates satisfactorily with concrete posts, and a similar type is available for use with wood posts.

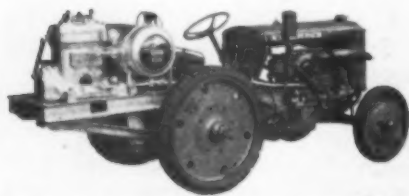
Meadows to Exhibit Asphalt Products

Sealtight asphalt products manufactured by W. R. Meadows, Inc., at Elgin, Ill., will be displayed with the attractive novelty of their uses in miniature. It is contemplated using a miniature bridge to show installation and application of asphalt flooring for wearing surface, asphalt plank for protection to waterproofing and waterproofing and damproofing abutments with Sealtight asphalt emulsion. There will also be a pavement slab showing the installation of premoulded expansion joint filler, and traffic lanes paints. A typical highway crossing will be on exhibit to show the uses of a railfiller. Sealtight aluminated asphalt paint for refinishing trucks, mixers and equipment, also will be displayed. Larger samples will be on hand to clearly show the details of the Sealtight products.

The exhibit will be in Booth A-97.

Two New Metalweld Units at Show

Metalweld, Inc., Philadelphia, Pa., will exhibit at the Road Show a 110-cu. ft. Metalweld-Worthington compressor mounted on an Allis-Chalmers Model U industrial tractor. This outfit, an illustration of which is shown, has been under practical working tests for the past month. Another new unit to be introduced at the show is a 75-cu. ft. Towabout portable compressor. In addition to these two units, the



Metalweld-Worthington Unit. to Be Seen at Show

company will exhibit their latest 330-cu. ft. compressor and possibly one or two other sizes of compressors.

Michigan Power Shovel Co. Will Exhibit Units

The Road Show exhibit of the Michigan Power Shovel Co., Benton Harbor, Mich., may be viewed in booth AR-23. One shovel unit and two crane units will be shown.



The Michigan Power Shovel Will Be at the Show

The following men will represent the company: Walter E. Bernhard, president and chief engineer; D. Harrison Millard, vice-president and sales manager; Don C. Abbott, secretary and treasurer; Ralph Thomas, district manager for Ohio and L. J. McClure, service man.

Midwest Locomotive Works to Announce New 25-Ton Engine

Midwest Locomotive Works, Hamilton, O., will exhibit one 8-ton and one 16-ton Mid-West gasoline locomotive together with a separate 16-ton Mid-West transmission. The company intends to put out an announcement bulletin at the Road Show describing a 25-ton gasoline locomotive that will be quite new in design.

Mohawk to Exhibit Asphalt Heater

Mohawk Asphalt Heater Co., Schenectady, N. Y., will have a complete exhibit of Hotstuf asphalt heaters, Mohawk Hi-Speed trailer tool boxes, Mohawk oil burning torches and concrete heating equipment.

New this year will be the Hotstuf three-in-one combination tool,

asphalt and surface heater, which as its name implies is three equipments mounted on a single chassis. A heavy channel section chassis, equipped with semi elliptic springs and rubber tired, roller bearing wheels carries a tool heating compartment which will handle 16 paving tools, and is said to deliver hot tools, ready for use in five minutes after lighting the Mohawk torches. This equipment is constructed of heavy gauge metal and the entire bottom is lined with 2 in. angles to reinforce the bottom, and provide a surface free from obstructions of any kind which might interfere with insertion or removal of tools. The equipment is heated by the use of two Mohawk torches, which have the removable coil feature, and deliver intense heat with great economy in the use of fuel. This equipment may be purchased singly and is provided with a rack for melting small quantities of asphalt in buckets, utilizing the heat from the same torches which heat the tools.

The asphalt heating kettle may be purchased with the tool heater, and is attached to the frame by bolts, being easily removable when the requirement for asphalt is not large enough to warrant the use of



Mohawk Hotstuf Combination Tool

the heater, which will deliver approximately 4,000 lb. of material melted to the proper temperature for use in an eight hour day. Fittings are provided on the frame for the attachment of the surface heater, which is swung between the wheels and may be raised for towing. This surface heater uses two additional Mohawk torches and will quickly heat a surface 3 ft. by 5 ft. in dimensions. The hood is built of heavy gauge metal, has reinforced edges and a separate liner in the top with Asbestos insulation to retain the heat on the pavement.

New also at the Mohawk Asphalt Heater Co.'s exhibit will be the Hotstuf lead melting pots, in various capacities up to 500 lb., and in two different models, one a wheel type with fuel tank attached to frame, and the other a leg type with separate fuel tank and burner.

Moon Tracks to Be Exhibited at Show

The Moon Track Co., Chicago, Ill., will exhibit semi-crawler tracks for McCormick-Deering, J. I. Case and Allis-Chalmers tractors.

These tracks are stated to involve a new feature in track construction. The driving pinions are in the center of the track, operating on both the top and the bottom of the track regardless of its position. The pinions are of manganese steel.

Another feature is that the shoes are self-cleaning. They are held together at one point only by a special bolted pin. This single shoe pin permits the shoes to open and close twice in every travel around the track. This opening and closing cleans the tracks of mud, clay, ice or any other material that they are traveling over. Two types of shoes are available, either smooth-tread for road work or sharp-tread for loose-ground work. Cleats can be supplied for the round tread. The shoes are reversible, thus doubling their life.

These tracks are quickly interchangeable with the wheels. The change can be made in about an hour's time. It is necessary merely to remove the rear wheels and fit the tracks on the axle; thus, in cases where speed supersedes the factor of traction, the wheels can be used and little time is lost in making the change.

Moon Tracks fit on present McCormick-Deerings, and are also being supplied with new tractors. The Moon Track Co. is also making tracks for the J. I. Case C tractor and the Allis-Chalmers U tractor, as well as the McCormick-Deering 10-20, 15-30 and industrial tractors.

Moritz Will Show Full-Size Machine

For the first time the Moritz-Bennett Corp., Effingham, Ill., will exhibit a full-size Moritz shoulder-finishing machine at the Road Show. In addition to a full-size machine, they will have moving pictures of the Moritz shoulder machine in operation on various high-



Moritz Shoulder-Finishing Machine

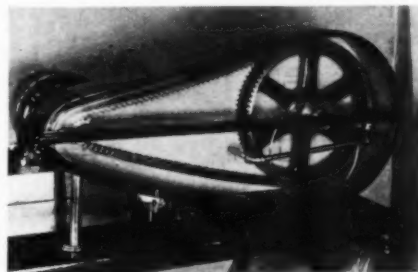
way projects throughout the country. Moritz exhibits in the past have consisted of small models of the Moritz shoulder machine.

The exhibit will be in booth A-104 in exhibition building A. There will probably be small working models on display in addition to the full-size machine. Those who will be in attendance will be as follows: E. A. Moritz, president; W. M. Bennett, vice-president and sales manager; C. J. Moritz, vice-president and treasurer, and J. S. Raleigh, chief engineer.

Morse Chain Co. to Have Novel Display

The exhibit of the Morse Chain Co., Ithaca, N. Y., in booth B-102, should prove particularly interesting to designers and builders of road-building equipment. Many of the leading manufacturers of power shovels, hoists and other material-handling units are equipped with Morse silent chain drives.

One novel display permits the observer to watch the true action of the patented Morse rocker joint.



Morse Automatic Ring Oiler

Another shows how the improved Morse automatic ring oiler insures proper lubrication. The Morse chain speed reducer and flexible coupling are hooked up to demonstrate how the chain type coupling takes care of end thrust and shaft misalignments.

The Morse exhibit will be in charge of D. M. McSpadden and H. G. Bates. Several engineers from the factory at Ithaca, N. Y., will be on hand to explain technical details. A. B. Wray, sales manager, and F. G. Anderson, promotion engineer, will also be in attendance.

Motor Improvements, Inc., Shows Oil Filter

Motor Improvements, Inc., Newark, N. J., will exhibit a complete line of heavy duty types of purulators, showing types equipped

with the fabric filter element and also types equipped with the metal filtering element. Their latest type of metal filtering element has a manual cleaning device which permits cleaning the filter element without the necessity of taking the case off of the purulator. The handle extends through the top of the case to provide for this clean-



Model G-21 Purulator

ing. When the handle is pulled up a piston operating inside the filter element forces a stream of filtered oil in a reverse direction through the interstices of the metal element washing away from the surface the dirt which has accumulated there during filtration of the oil. The dirt so washed away drops to the bottom of the filter case from which it can be drained at intervals. This method of cleaning provides a very rugged element that cannot jam or be broken during cleaning.

The exhibit will be in booth B-93. L. W. Williams, sales engineer from the Newark office, and Frank P. Herman, factory sales manager from the Detroit office, will be present at the show throughout its duration. It is very likely that J. A. Graham, president of the organization, and R. P. F. Liddell, chief engineer, will be at the show for a day or two.

National Carbide Lights to Be Displayed

The Road Show exhibit of the National Carbide Sales Corp., New York, N. Y., will feature the National carbide V-G light, the National carbide V-G handy light and the National carbide lantern.

The V-G light spreads a full, even beam of about 8,000 cp. It gives clear, steady light for about 9 hours on one 5-lb. charge of carbide and 5 gal. of water. It weighs 30 lb. empty and 75 lb. full, and is easily handled by one man.

The V-G handy light is smaller in size, consisting of a tank holding 5 qt. of water, a hopper containing a 1½-lb. charge of carbide and the feeding device. It runs for approximately 5 hours on this



A Former National Carbide Exhibit

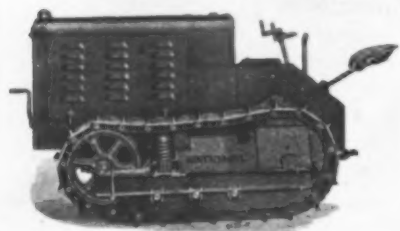
charge and delivers about 1,500 cp. It weighs 23 lb. when charged.

The National carbide lantern burns 8 hours on an 8-oz. charge of carbide and a filling of the water chamber. A rear signal of red, blue or green is supplied if required.

Extensive improvements have been made in these lights during the past year. The accompanying photograph shows a former National Carbide exhibit.

National Brake & Electric Co. Exhibit

The National Brake & Electric Co., Milwaukee, Wis., will exhibit its portable compressor and its Na-



National 25 Truck-Tractor

tional truck-tractor. The following members of the National Brake & Electric Co., will be in attendance at the show: P. L. Crittenden, vice-president and general manager; F. B. Peterson, A. M. Poole, E. A. Haertlein, G. R. Bruner, B. S. Aikman and J. S. Franco, of Milwaukee; O. S. Compton, of Philadelphia; L. M. Pease, of Los Angeles, and O. W. Swartz, of Dallas.

National Paving Brick Exhibit

The exhibit of the National Paving Brick Manufacturers Association, Washington, D. C., will include photographs of brick pavements in all parts of the country; literature regarding the use of vitrified brick as a paving material for free distribution; moving pictures of the manufacture and use of vitrified brick; a model showing a brick paved city street and intersection and a brick paved rural highway under construction. There will also be a model and photographs of the experimental brick pavement on metal base recently constructed near Springfield, Ill.

F. B. Dunn, acting president; W. C. Perkins, consulting engineer, and George F. Schlesinger, chief engineer and managing director, will be in attendance at the exhibit booth.

National Steel Fabric Co.

The National Steel Fabric Co., Pittsburgh, Pa., will occupy booth A-64-B at the Road Show and will exhibit styles of electrically-welded fabric and equipment for handling fabric. The exhibit will be in charge of H. H. Robinson, St. Louis district manager. The following men will also be in attendance: Robert L. Glose, manager of sales; C. B. Dugan, Chicago district manager; H. D. Stone, Pittsburgh district manager; A. J. Marr and J. C. Kinzy, from the St. Louis office, and W. S. Edge, special representative.

National Traffic Guard Co. Will Show Resiflex

The Road Show exhibit of the National Traffic Guard Co., Atlanta, Ga., will include full-size sections of Resiflex road guard mounted on posts, a miniature installation intended to demonstrate the action of traffic on the guard and a moving-picture display showing general views, results of contacts on highways and vehicles contacting the rail during practical tests.

The accompanying illustration shows Resiflex road guard mounted on 8-in. square California redwood posts. A recent improvement in this type of guard rail concerns the end anchorage. The anchorage is practically as strong as the rail plate itself, and is adjustable to control the tension adjustment in the rail plate.



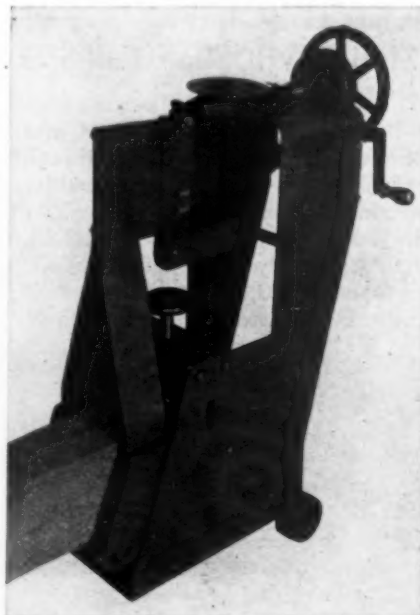
Resiflex Road Guard Mounted on Redwood Posts

The strength of the rail plate has also been increased, so that it now has a total tensile strength of approximately 60,000 lb.

Olsen Testing Machines

The Tinius Olsen Testing Machine Co., Philadelphia, Pa., will exhibit the latest Olsen-Andrew road surface rater and also the latest Olsen portable beam tester to meet requirements of the A. S. T. M., together with a portable mold for use in connection with the tester, so that two breaks may be made in the 30-in. beam and indicate the modulus of rupture direct. There will also be demonstrated the very latest Olsen automatic shot cement tester of combined dial and scale beam type, as well as other small apparatus used in cement and concrete testing, including strain gauges.

There will also be shown the most recent development of this manufacturer in balancing machines for balancing rotating parts, consisting of the Olsen-Lundgren



Olsen Concrete-Beam-Testing Machine

new-type dynamic balancing machine, operating on the centrifugal high-tension spark principle, with the latest Olsen semi-automatic push-button control.

The Olsen concrete-beam-testing machine, vertical type with worm drive, may be easily and conveniently moved from place to place. This machine is well adapted to either laboratory or field use where a light, compact, yet rugged machine is desired for accurately testing the quality of cement or concrete.

The worm drive enables the operator to apply heavy loads by hand crank smoothly and uniformly. The large hand-wheel is for rapid adjustment or for application of light loads. When this hand-wheel is used for applying the load, the worm drive and hand crank are automatically disengaged.

Rollers on which the beam rests aid in easily placing it in the desired position. Adjustment for alignment or for removal of the specimen is secured by operating the small handwheel at the center. Load is applied by the crank until rupture occurs. Stops are provided to protect the instrument at the rupture point of the specimen and the machine is so arranged that after rupture the parts are easily removed.

Modulus of rupture up to a maximum of 1,000 lb. is indicated directly by set pointer on the dial without computation when the machine is set for the test which is being made. This dial operates smoothly and is so placed that it is easily read by the operator.

Page to Feature Highway Guard

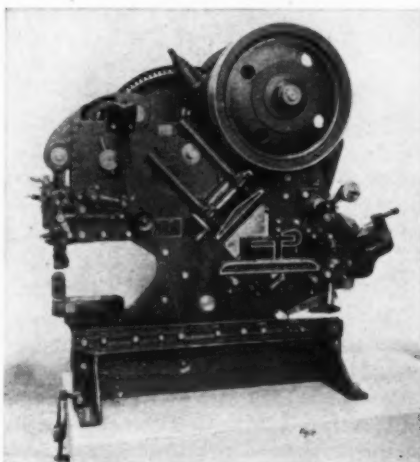
The Page Steel & Wire Co., Bridgeport, Conn., will occupy space B-8 featuring highway guard and a moving picture showing more recent installations.

Henry Pels & Co.

Henry Pels & Co., Inc., New York, N. Y., will exhibit in space B-76 a Type MAE-16 combination punch, plate shear and angle, bar and tee cutter with built-in notcher. This machine will be demonstrated in operation, performing its various classes of work. It will punch $1\frac{1}{8}$ -in. holes through $\frac{5}{8}$ -in. stuff or $\frac{7}{8}$ -in. holes through $\frac{3}{4}$ -in. stuff, will split $\frac{5}{8}$ -in. plate and will cut $6 \times \frac{3}{4}$ -in. flats.

This machine is made in eight

different sizes and different styles; that is, with and without the punch, with or without the notcher or in entirely separate units for the various classes of work. However, the combination machine has become most popular and has been introduced very successfully in factories making all kinds of road-



MAE-16 Combination Punch, Shear Cutter and Notcher of Henry Pels & Co., Inc., in Operation at Show

building machinery and equipment, agricultural machinery and many similar products in which structural steel shapes, such as angles, beams, channels, etc., also bars, plates, etc., are used. The machine will do all the cutting required, including the beveling of angles and tees and the punching, notching and splitting of plates without change of the set-up, and consequently saves a great of time and labor. The cuts produced are surprisingly clean.

Perfection to Exhibit New Hoist and Body

The Perfection Steel Body Co., Galion, O., will occupy booth B-21, where it will exhibit its new model No. 100 mechanical hoist and body. This unit will be made adaptable to all 1 and $1\frac{1}{2}$ ton chassis. It is rapid acting, and is stated, will raise to full dumping height in 5 seconds. It is made so that it can be raised or lowered at the will of the operator. A partial load can be dumped and the body brought back into a riding position. All gears are steel, all other cast parts are malleable. The body that is mounted over this hoist has a capacity of $1\frac{1}{2}$ cu. yd. which can be increased to 2 cu. yd. by the use of side boards.

Another new item also will be shown. This is model No. 41, com-

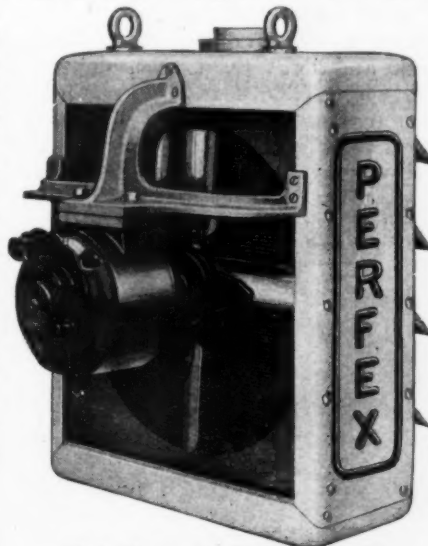
bination of hand hoist and gravity, all in one unit. It only takes a few seconds to change this unit either to a hand hoist or back again. This unit will be made to fit all short wheel base chassis of 1 and $1\frac{1}{2}$ ton capacity. The body that will mount on this unit is a $1\frac{1}{2}$ cu. yd. which can be increased to 2 cu. yd. with the addition of side boards.

There also will be an exhibit model No. 21, quick acting gravity dump body with the control in the cab. With this unit the driver does not have to leave his seat in the cab to have complete control of both the dumping of the load or bring back the body into a riding position. The tailgate is double acting and will open automatically when the load is dumped. It will also close when the body is brought back into a riding position.

C. R. Bates and H. Cohen will be in attendance in the booth.

New Perfex Products Will Be on Display

In line with the progressive policy that the Perfex Corp., Milwaukee, Wis., has maintained during the twenty years it has been manufacturing heavy-duty industrial cooling radiators, a new line of radiators for passenger cars has been developed. This new addition consists of a cellular-type core, another progressive step made by this manufacturer is the entry into the unit-heater industry. This step has been made following a thorough investigation of this important market, combined with over three years of conservative but intensive engineering research into unit-heater design and construc-



Unit Heater in Perfex Exhibit

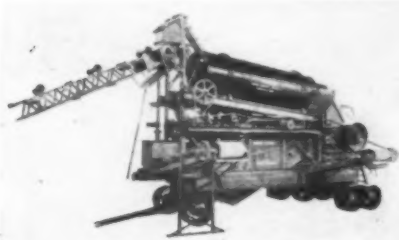
tion. The unit heaters manufactured by the Perfex Corp., are made in sizes to meet practically every heating requirement, for use in buildings such as industrial plants, warehouses, garages, greenhouses, airplane hangars, gymnasiums and a host of other interiors where economical and efficient heating requirements are vital factors. In conjunction with the unit heaters is a versatile line of blast cores for process drying, such as wood, wool, candy, macaroni, leather, ceramic products, etc.

A full line of radiators, unit heaters and blast cores will be exhibited at the Road Show, with Roger Birdsell, T. C. Cornell and R. W. Wilson in attendance, in booth B-59.

Pioneer to Show New Portable Gravel Washing Plant

The Pioneer Gravel Equipment Mfg. Co., Minneapolis, Minn., will exhibit in Space No. AR8, the 1931 Pioneer 300W screening, crushing, loading and washing plant. The plant is equipped with a feeder belt conveyor leading up to the scrubber section of the 42 in. diameter screen. In this scrubber section of the shell around the revolving screen the materials receive their first wash. The oversize material is delivered into a 1236 Universal crusher and returned by means of a bucket elevator to the revolving screen.

The materials that have passed through the perforations of the revolving screen are classified on the SKF bearing equipped shaker screen, situated directly underneath the revolving screen. The screen plate on the shaker screen is 15 ft. long and 30 in. wide. Underneath the shaker screen is constructed a dehydrator, a sand paddle arrangement which scoops up the sand from the settling tank and delivers it to a delivery conveyor. The coarse aggregate is also delivered to a storage bin or stock piles by means of a second delivery conveyor. The intermediate sizes of pea gravel may be sluiced away or may be saved if desired.



New 300W Gravel Washing Plant

The entire plant is equipped with anti-friction bearings wherever the wear and stress seems to make roller bearings necessary. Steel cut and chilled sprockets are used throughout. Diamond roller chain is standard on all important drives. The weight of the unit is approximately 50,000 lb. The wide spread of its three sets of Timken bearing equipped wheels permits easy haulage by tractors. Athey truss crawler type wheels may be used instead of the two rear trucks as pictured.

The company also will exhibit a double drum dragline unit specially designed for attachment to a Caterpillar 60 tractor.

Pneu-Hydro Road Planer

The Pneu-Hydro Road Machinery Co., Cadillac, Mich., will exhibit the Pneu-Hydro road planer in space A-4 in the north exhibition building. This is the only machine this company will exhibit. This planer is designed for high-speed truck maintenance and is



The Pneu-Hydro Road Planer

controlled entirely by a low-pressure air system. It will operate at any desired speed as high as 20 m.p.h., but best results are secured at a travel of from 10 to 12 m.p.h.

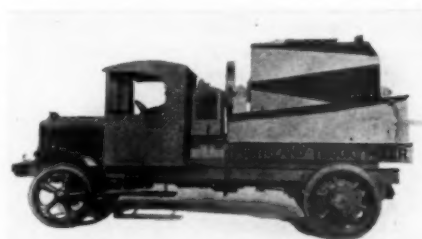
Springs have been done away with in this machine, vibration and road shock being absorbed by two air cylinders. Pressure can be applied to either end of the machine independently of the other end, so that the operator can cut with half of the blade and spread with the other half. The loose material is spread out before reaching the end of the blade, thus leaving no windrow or ridge along the shoulder or center of the road. The adjustment can be made in 15 seconds from the driver's seat without stopping the truck. For ordinary purposes the maintainer does effective work on a pressure of 20 to 30 lb. The machine can be reversed to any desired position in the plane by simply loosening six bolts; it is not necessary to drive on the wrong side of the road. Pressure gauges on the dash inform the driver of the pressure at a glance. The planer is made in 8, 10 and 12-ft. models.

Portland Cement Association at Show

Among the exhibit material of the Portland Cement Association whose headquarters are at Chicago, Ill., will be large photographs and descriptive matter pertaining to the use of concrete in road construction. It is intended to show a large wall map of the United States with the concrete highways shown in red. A companion exhibit piece will be a large picture map of the United States with photographs of concrete highways typical of each state cut to fit the boundary lines of the individual states. A part of the exhibit will illustrate the use of single-lane concrete pavement for farm roads and county roads carrying very light traffic.

Novel Display of Portland Concrete Machines Co.

The Portland Concrete Machines Co., Cleveland, Ohio, will be represented in space AR-20 of the main arena by C. B. Dutton, president; J. P. Cullen, engineer; Fred Frenz, salesman; H. H. Perry, vice-president, and three service men. In the booth will be a Model K automatic face-down concrete machine, arranged with a 24-ft. stationary mixer and skip hoist mounted above it, the whole group being operated and actually making blocks. There will be an ob-



Truck Mixer of Portland Concrete Machines Co.

servation gallery, from which the whole operation can be observed. There will also be a 3-yd. Portland concrete mixer mounted on a White Model 55 chassis and rotating.

Relay Will Show New Model

The display of the Relay Motors Corp., Lima, Ohio, will include their latest model, the duo-drive 300A. In addition to this they will exhibit one of the Model 40A series, 2½-ton capacity, with a



Relay Truck, to Be Seen at Show

Heil body and hoist. The Relay space is B-82 and 98.

Those attending the show from the factory will include L. A. Graham, W. J. Baumgartner, Alain Madle, R. L. Roush and W. E. Murphy.

Reo Speed Wagons Will Be on View

Adaptability of the Reo Speed Wagon to the varying problems of the road-building contractor will be demonstrated in the booth of the Reo



Model FH Reo Speed Wagon

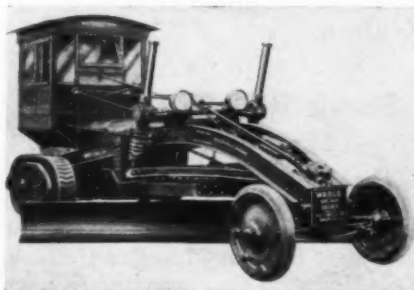
Motor Car Co., Lansing, Mich., at the Road Show. The accompanying illustration shows the Reo Model FH Speed Wagon chassis with 1½-yd. dump body.

Warco Road-Building Machinery Will Be Exhibited

The W. A. Riddell Co., Bucyrus, O., will exhibit representative items from its line of road building and maintaining machinery in space A-23, in exhibition hall A.

Among machines included will be the Warco Model E power grader with TGA rear-type crawlers, and bulldozer attachment.

Warco will also exhibit its Model 10-R rear-control power



Warco Model 10-R Power Grader with TR Rubber Crawlers

grader with Model TR rear-type rubber crawlers. This will be the first exhibition of the newly developed Warco rubber crawlers.

The Model 10-R will be equipped with an all-enclosed cab, and with storage battery, generator, and lights, and snow plow attachment.

The Warco 1-yd. and 2-yd. wheeled scoops also will be shown. The 1-yd. scoop will be shown on the floor with an operating motor, so that the functions of the scoop can be demonstrated.

The exhibit will be directly in charge of N. E. Jersey, road machinery sales manager. Other Warco representatives at the show will include W. A. Riddell, president; G. M. Schmidt, general manager; G. D. Shaeffer, grader engineering department; C. A. Henneuse, crawler engineering department; and J. E. Patterson, scoop engineering department. Warco field men, distributors and dealers will also be on hand to welcome contractors and public officials who will come in to the show from their respective territories. A cordial invitation is extended to them all to make Booth A-23 their headquarters during the period of the show.

Rightway Will Show Multi-Wheel Drive, Plows

The Rightway Corp., Chicago, Ill., will exhibit in space A-116, showing its multi-wheel drive, rotary snow



Rightway V-Plow and Rotary Shovel

shovel and V-plow. The V-type plow is a new development with this organization. It was designed primarily for use in combination with the familiar Rightway rotary shovel, but it has been offered for truck use generally, as the shovel and plow work independently. The plow is pushed from the front end of the truck frame through flanged rollers which resist the side thrust. The curvature of the moldboards is such that the snow is thrown well over to the side when the truck is operated with speed. Features of this plow are a blade on the prow to split frozen

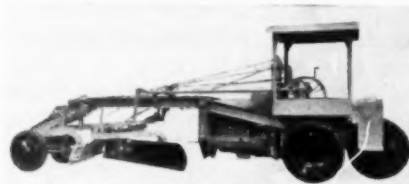
snow formations, a double shear mounting for the blades, a fast and easily operated hoist and large, adjustable shoes with removable wear plates. It is expected that this plow, and also the new multi-wheel drive, will attract considerable attention at the show.

Novel Roller-Bearing Exhibit

The Roller Bearing Company of America, Trenton, N. J., will exhibit roller bearings in sizes from 3/8 to 13-in. shaft diameter, showing a complete range of sizes as used in automobiles, trucks, tractors, farm implements and road-building and excavating machinery. This display, which includes a table using the same rollers from which the company's bearings are made, has created favorable comment at previous shows.

Rome to Show New Motor Grader

The Rome Mfg. Co., Rome, N. Y., will exhibit a number of models of Rome High Lift graders. A number



Rome Multi-Wheel Motor Grader

of new models have been added to the Rome Line during the past year, including the Rome multi-wheel motor grader. This machine will be exhibited at St. Louis. The Rome Manufacturing company will be represented by J. M. Patterson, general manager; G. D. Finney, sales manager, and sales representatives. Their exhibit will be located in space A-51.

Rusco Products to Be Exhibited at Road Show

A large and attractive exhibit, showing plastic models of Rusco products, will be on display at the St. Louis Road Show, by the Russell Mfg. Co., of Middletown, Conn., according to W. T. Palmer, manager of the company's replacement department.

The exhibit will include a clever and scientific mechanical apparatus demonstrating what actually takes place in the curing of Rusco Roldak brake lining after it is applied to a motorist's car. It will show exactly how the brake lining,

which is flexible when first attached to the brake shoes, molds itself into an exceptionally hard and durable lining through heat and pressure developed by the brake mechanism in the normal application of the brakes. Rusco Roldak fits itself exactly to the slight variations in shoes or drum. This is possible only because it is self-moulding and is cured in actual position on the brake after it is applied. Samples showing the before and after effects on the lining will be given out at the show.

In connection with a spectacular setting the Russell Mfg. Co. will also display types of Rusco brake linings, aero products, Durak brake-shoe liners, clutch facings, Rusco clutch spider, Rusco riveting and brake relining machines, brake-drum lathes and grinders and other mechanical apparatus of this type.

Those in attendance at the Russell booth will be prepared to assist prospective brake-lining distributors and service-station proprietors with informative booklets on the running of super-service stations and instruction circulars on various brake-lining and brake-servicing jobs. Rusco will also exhibit its various types of dealer helps including window displays, counter displays, neon signs, advertising campaigns and a full description of the new Rusco insurance plan.

Ryan to Show New Shoulder Building Attachment for Grader

The exhibit of the Ryan Manufacturing Corp., Chicago, Ill., will be in space 56-A, where a Ryan motor controlled grader will be shown. This machine has attracted much interest at former shows because of its unusual range of effective blade positions, all secured by means of a small gas engine driv-



Ryan Grader at Work

ing the controls through a simple gear box. An added feature to be shown for the first time this year will be a shoulder building attachment. R. F. Johnson, general manager, O. Q. Hinds, sales manager, G. J. Oie and James H. Smith, district representatives, will be in attendance.

Sauerman Will Exhibit Cableway Model

The Sauerman exhibit at the Road Show will be in booth B-67 in building B. The central feature of the exhibit will be a working model of a Sauerman slackline cableway operated by an electric motor and a similar model of a Sauerman power drag scraper system. The cableway will show how gravel is excavated from a deep pit and delivered to the top of a screening plant in a straight-line operation, while the scraper model will illustrate the latest method of storing and reclaiming the surplus output of a screening plant.

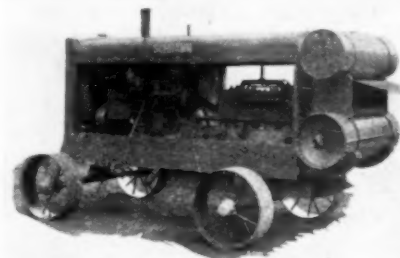
Machinery items on display will include a Crescent scraper bucket and several sizes of Sauerman Durolite blocks with sheaves of heat-treated cast steel. Moving pictures will be shown of Sauerman machines digging gravel from rivers and dry pits, making a cut and fill, storing and reclaiming crushed stone, etc. James L. Nellis will be in charge of the exhibit for Sauerman Bros, Inc., Chicago, Ill.

Schramm Will Show New Diesel Compressor

Schramm, Inc., West Chester, Pa., will exhibit a complete line of portable engine-driven compressors, together with pneumatic tools and accessories. This display will feature the new Schramm diesel-engine-driven compressor, having a displacement of 360 cu. ft. of free air per minute.

This compressor is automatic in control, simple in design and free from vibration. The compressor is the standard Schramm four-cylinder, single-stage, vertical, water-cooled unit, suitable for 100 lb. maximum working pressure. Power is furnished by a Buda-M.A.N. diesel. The complete outfit is mounted on an exceptionally large frame and heavier steel base and connected to the diesel engine with the same type of heavy-duty self-aligning clutch used on all Schramm engine-driven compres-

sors. This clutch is a distinctive Schramm feature which permits the starting of the engine independent of the compressor. The compressor can also be thrown out of service while the engine is operating at maximum full-load speed. Not only is this clutch coupling



New Schramm Diesel-Driven Compressor

satisfactory for starting purposes, but it is also flexible in structure so that no wear is thrown on the engine or compressor bearings. Several of these outfits have been in operation at experimental test stations under severe working conditions for nearly a year.

The Schramm exhibit will occupy space B-42, and will be in charge of A. O. Witt, manager of sales promotion.

Servicised Premoulded Products Will Show Innovations

The exhibit of Servicised Premoulded Products, Inc., in space B-138, should prove interesting to contractors and engineers alike. In addition to their regular line of premoulded asphalt expansion joints, bridge planking and various premoulded specialties, Servicised will exhibit several innovations in these products, including several types of rubber and combination joints. Among the latest developments will be found a new type of rubber flooring, the success of which is based on an entirely new method of interlocking the wearing surface with the base, permitting positive anchorage. This surfacing is adaptable to both indoor and outdoor use. The exhibit will be in charge of the St. Louis Servicised representative, R. W. Ketchum.

Shunk Will Show Varied Line of Products

The Shunk Mfg. Co., Bucyrus, Ohio, will exhibit the new Camel automatic gravity tractor dump for the first time at the Road Show. This dump has a capacity of from 4 to 5 cu. yd. Its nose may be converted into a bulldozer, designed to

Every year for many years will be a big year for Tarvia "Re-Tread"

The economy and speed of Tarvia "Re-Tread" construction make a stronger appeal every year to road officials who must make a little money do the work of a lot.

No other type of pavement can be built so quickly and cheaply, and with so little expensive equipment. First cost and subsequent maintenance are so low that there is no longer any reason for dusty, rough or dangerous surfaces, even on light traffic roads. Tarvia "Re-Tread" provides smooth, skid-safe, easy-riding pavement—pavement that will withstand a surprising amount of traffic.

A thorough understanding of Tarvia "Re-Tread" will insure its inclusion in your plans for 1931. The Tarvia field man will give you the details. 'Phone, wire or write our nearest office.

Tarvia "RE-TREAD"

Trade Mark Reg. U. S. Pat. Off.

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Please mention ROADS AND STREETS—it helps.

bulldoze, grade, level and backfill. The machine is gear-driven, but the full load is carried by an auxiliary axle, so that no strain is placed upon the driving axle. A hydraulic governor checks the gravity return movement of the body. Wheel equipment is interchangeable, allowing the use of crawlers, steel wheels or pneumatic tires. The power unit is a McCormick-Deering 10-20 tractor.

The Success twin-dual maintainer will also be shown by the Shunk organization. This is a light-draft machine, capable of being operated by a 15-30 tractor. Each set of dual



The Shunk Camel Tractor Dump

blades is controlled separately by three large handwheels, easily operated, to raise or lower the heel or toe or to draw them into the machine into a neutral position. The rear blade is also raised or lowered with its own handwheel. Two additional adjustments offer varied positions for this blade. The roomy platform gives the operator free access to all of these adjustments. All five blades are double-edged, extra wide, of high carbon steel, reversible and interchangeable to all positions on the machine. They are concaved, ground and polished. The Success maintainer is particularly adaptable to light construction work and shoulder or berm construction or maintenance work. The machine can be drawn along the hard part of the pavement and maintain soft shoulders of any width up to 10 ft. if desired, when extensions are affixed.

Other Shunk products of interest to Road Show visitors are traffic markers and grader blades or cutting edges to fit all makes of road machinery. Those in charge of the exhibit, which will be in booth A-58, are C. H. Richardson and G. H. Fegley, factory representatives.

SKF to Show Bearings

SKF Industries, Inc., New York, N. Y., will show interesting devices featuring the anti-friction qualities of its bearings in space

B-79. In addition, there will be on display a complete range of SKF ball and roller bearings. Those in attendance at the SKF Industries, Inc., exhibit will include R. H. DeMott, F. J. Rider, Otto Neumer, J. B. Castino.

Snap-On Tools Exhibited

Snap-On Tools, Inc., Kenosha, Wis., will occupy booth B-88. The exhibit will include the complete lines of Snap-On socket wrenches and Blue Point boxsocket wrenches, end wrenches of all types, wheel pullers, mechanic's hammers, screw drivers, chisels and punches and other mechanic's hand tools required for the repair and maintenance of trucks, tractors and road machinery of all kinds.

The feature of the exhibit will be an electrically operated display, which will picturize the nationwide service maintained by the company through 28 distributing warehouses and a force of 350

Solvay Will Feature Dust Laying, Ice Removal

The Solvay Sales Corp., New York, N. Y., will feature the use of calcium chloride for road maintenance. Their Road Show exhibit will consist of units showing the use of calcium chloride for dust laying and ice removal, together with an exhibit of concrete beams of given composition with and without an admixture of calcium chloride. The exhibit, which, it is expected, will be fully up to the high standard of previous Solvay exhibits, will be in charge of George H. Kimber.

South Bend Lathe Works Exhibit

Equipment for the maintenance department shops will be featured by the South Bend Lathe Works, South Bend, Ind., in its exhibit in booth B-92. The company is showing improved types of large

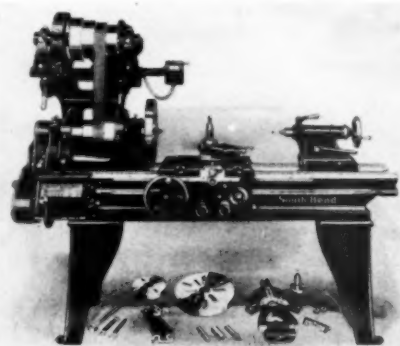


Display of Snap-On Tools

salesmen. Different colored lights are used to indicate the factory locations and the different branches and the force of salesmen working out of each branch. This arrangement serves to emphasize the direct contact and service with road construction crews on the job in any section of the United States.

St. Paul Hydraulic Hoist Exhibited

The St. Paul Hydraulic Hoist Co., St. Paul, Minn., manufacturers of the nationally-known St. Paul hoists for dump trucks, will exhibit in space B-131. In attendance will be V. L. Farnsworth, Fred Bell, Jr., and Harold H. Miller.



New Model South Bend Lathe

FOR 1931:

made possible by 1930 performance

\$50 To \$600

PRICE REDUCTIONS

on

GENERAL MOTORS TRUCKS

500 lbs. to 3,500 lbs.

GUARANTEED CAPACITY INCREASES
STRAIGHT RATING

ON 10 GREAT MODELS, 133 DIFFERENT TYPES

\$50 Less

MODEL T-15: Price reduced \$50; straight rating capacity increased 1,100 lbs.—now $\frac{3}{4}$ -ton and 1-ton range... 130" and 141" wheelbases, 10 different types available...

Now \$645
(TYPE 1501)

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MODEL T-17: Price reduced \$70; 1-ton range... 130" and 141" wheelbases, 8 different types available—7 $\frac{1}{2}$ " and 9" body lengths...

Now \$675
(TYPE 1703)

THIS starts the new year with a big piece of value-news for truck owners. Effective today, price reductions or capacity increases—or both!—bring higher value than ever, in 10 great General Motors Truck models: affecting 133 different types of modern haulage and delivery equipment. Increased capacities mean greater earning power per truck. It is made possible by what happened in 1930. Lowered material costs were coupled with production savings. And it is a General Motors Truck policy to share such advantages with truck owners. So, more than ever, it's going to pay every truck owner to find out what General Motors Truck offers *before* he buys! See these trucks today. Try them out. Ask men who own them about the extra earning ability designed and built into them. Start 1931 with delivery or haulage equipment that can do a real share in building your business and profits!

(All prices: Chassis, f. o. b. Pontiac, Mich.)

A GENERAL MOTORS VALUE:

\$150 Less

MODEL T-19: Price reduced \$150; 1 $\frac{1}{2}$ -ton range... 130", 141" and 152" wheelbases—22 different types available—7 $\frac{1}{2}$ ", 9" and 10 $\frac{1}{2}$ " body lengths...

Now \$745
(TYPE 2201)

\$600 Less

MODEL T-90 (six wheeler): Price reduced \$600; 5-7 $\frac{1}{2}$ -ton range... 185 $\frac{1}{4}$ ", 201" and 220" wheelbases, 7 different types available... Brown - Lips over - and - under drive auxiliary with 4-speed main transmission standard (12 speeds forward, 3 reverse).

Now \$5285
(TYPE 9001)

GENERAL MOTORS TRUCK COMPANY, Pontiac, Mich. (Subsidiary of Yellow Truck & Coach Mfg. Co.)

GENERAL MOTORS TRUCKS, YELLOW CABS and COACHES

Factory Branches, Distributors, Dealers—in over 2000 principal cities and towns

(Time payments financed through Yellow Manufacturing Acceptance Corporation plan, at lowest available rates)

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having its own motor built into the machine itself. This lathe will be connected to the electric current, in operation, and an operator will be in attendance demonstrating some of the work for which the machine is capable.

A new model Junior 9 in. swing bench lathe is also being exhibited. The 9 in. lathe is built to the same standards, with the same precision, and is of the same design as the larger size South Bend lathes which have been on the market for the past 25 years. Another 9 in. junior lathe of the motor driven type is to be demonstrated in operation at the booth.

Those in attendance will be Roy S. Young and F. C. Erhardt, representatives of the South Bend Lathe Works from their factory at South Bend, Ind.

Splitdorf Exhibits New Magneto

Splitdorf Electrical Co., Newark, N. J., will exhibit in booth No. B-62 its complete line of magnetos and spark plugs. A new model B magneto, designed especially for heavy duty work in trucks, buses,



Model B Magneto

compressors and for other gas engine equipment in the road building and construction field, will be shown. The company's representatives will be E. D. Roach, equipment sales manager; and Lee L. Sable and Jack Linney, sales representatives.

Sterling Hoists and Pumps

The Sterling Machinery Corp., Kansas City, Mo., will exhibit at the Road Show the following: one 25-30-hp. Sterling Type A double-friction-drum gasoline-en-

gine-driven hoist; one 10-13-hp. Sterling Type C double-friction-drum gasoline-engine-driven hoist; one 500-lb.-pressure, 85-g.p.m. direct-connected road pump, and two 3-in. positive-priming centrifugal pumping units.

Streich to Show Trailer

The exhibit of A. Streich & Bro. Co., Oshkosh, Wis., will be in booth A-84 and at the demonstration field. They will show No. 750 disk wheel trailer in 7 yd. capacity, No. 950 cart type trailer of all-steel construction in 7 yd. capacity, No. 1250 trailer with Streich push-track wheels front and rear, in 14 yd. capacity, No. 1150 trailer with Streich push-track wheels front and rear, 20 yd. capacity.

The No. 750 trailer with disk wheels in 7 yd. capacity is practically of all-steel construction. The foundations of the sides of the base box are oak. This trailer is equipped with the new automatic wind-up, which is of the gear type. This winding device is very simple, strong and positive and there is nothing about it which can get out of order. The trailer is being shown equipped with steel topbox for use in connection with elevating grader. The wagon may be had with topbox with equal sides for use with shovel.

The No. 950 trailer is of the cart type. It is of all-steel construction and is equipped with 20-ton Streich push-track wheels. This wagon may be had in 5 and 7 yd. capacity.

The No. 1250 trailer is also of all-steel construction and is of 14 yd. capacity. It is equipped with Streich push-track wheels, front—6 ton, rear—20 ton.

The No. 1150 trailer is of all-steel construction, of 18 yd. capacity for use with elevating grader and 20 yd. capacity for use with shovel. It is equipped with Streich Push-Track wheels, front—6 ton, rear—30 ton.

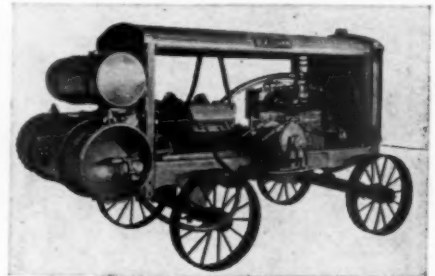
Several improvements were made in the trailers during the past year. The poles are heavier and of extra strong construction. The circle risers have been materially strengthened. The bottom doors have been reinforced at all points where there is great strain. All wagons are equipped with an up-to-the-minute winding device which works very easily and is very rugged. F. A. Streich will have charge of the exhibit.

Sullivan at Road Show

The Sullivan Machinery Co., Chicago, Ill., will exhibit at the 1931 Road Show, occupying space

B-39 in the west building near the north end.

The Sullivan exhibit will be centered around portable air compressors and compressed-air equipment for the road builder and contractor. There will be four air compressors, including the Sullivan vibrationless portable unit in three sizes, 66, 110, and 310-ft. capacity. In addition, a 7x6 WG-6 horizontal



Sullivan Four-Cylinder Vibrationless Portable Compressor, with 3-Hp. Turbine Air Hoist Mounted on Turntable

straight-line compressor, operated by an electric motor, will supply compressed air for use in the booth.

A Sullivan 3-hp. Turbinair portable hoist will be mounted on a turntable on the side of the 310-ft. unit to show the convenience of this type of hoist for many field purposes in connection with portable compressors.

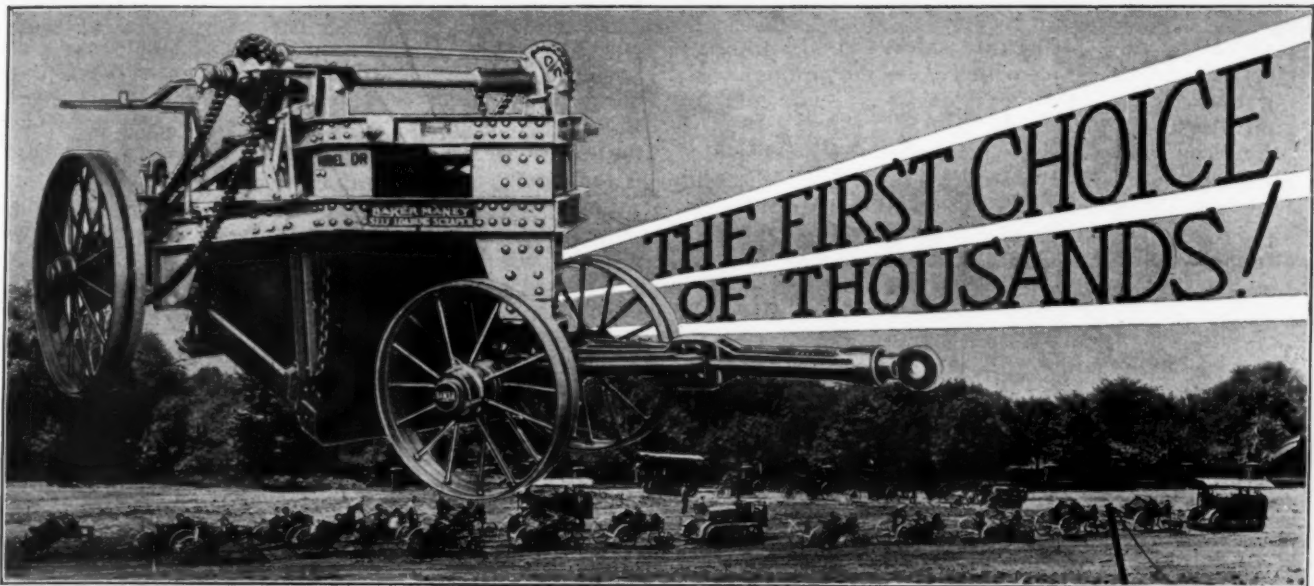
Sullivan rock drills in several sizes will be shown, including the L-6 58-lb. rotator, the L-8 40-lb. rotator and the new L-1 30-lb. light rotator.

New concrete breakers in three different types will be shown, including the K-5 and K-6 heavy-duty busters and the new Sullivan lightweight buster. Two types of Sullivan clay spaders will also be shown. These tools will be demonstrated on a block of concrete in the exhibitor's booth under full air pressure.

The Sullivan portable drill sharpener, Class C, and the Sullivan drill-steel furnace, operated by gas piped into the booth, will be shown in actual operation making bits and shanks on hollow drill steel.

A Sullivan pavement test core drill will also be on exhibition, together with samples of cores taken from pavements of different character.

An interesting item of equipment to be shown for the first time at this exhibit will be a Tanner tank and Tannergas, a newly developed method of preventing freezing at the exhaust of rock drills, busters and other pneumatic equipment.



BAKER MANEY Self Loading Scrapers

"The Original Self Loaders"

1½ cu. yd. - 1 cu. yd. - ¾ cu. yd.

Only with a 4-wheel scraper can you get stability—thorough compacting action and extremely short turning radius.

20

BAKER MANEYS owned by Fatout Const. Company, Indianapolis, on 200,000 cu. yd. grading job—constructing addition to Crown Hill Cemetery, Indianapolis.

Thousands of contractors and road officials have expressed preference for Baker Maneys because of these outstanding features—big capacity—easy, quick operation—extremely short turning radius—low center of gravity—accurate cutting—rugged construction—low operation and maintenance costs. What more could you ask of a dirt moving machine? When earth movers tell us (and prove it) that Baker Maneys have saved their price in a single short season—when they say they would rather be without any piece of their equipment than be without Baker Maneys—when they continually add Baker Maneys to their equipment year after year—they are proving the statement that "it pays to make 'em good."

Now Timken Bearing Equipped

Model DR, 1½ cu. yd. and Model KR, 1 cu. yd. Baker Maneys are now regularly equipped with Timken Tapered Roller Bearings giving them greater operating efficiency and longer life.

See the Baker Exhibit at

1931 ROAD SHOW

ST. LOUIS, MO.

January 10th to 16th

Or clip the coupon below and receive catalogues on Baker Tractor Equipment.

The Baker Manufacturing Company
506 Stanford Ave., Springfield, Ill.

Send literature and prices on Baker Equipment.	Baker Maney Scrapers	<input type="checkbox"/>
	Rotary Scrapers	<input type="checkbox"/>
Name	Bulldozers	<input type="checkbox"/>
	Backfillers	<input type="checkbox"/>
Address	Maintainers	<input type="checkbox"/>
506	Snow Plows	<input type="checkbox"/>



Products You Should Know --



Baker Bulldozer

Baker Bulldozers and Backfillers

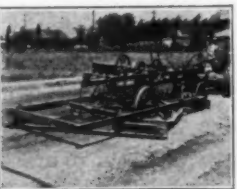
Baker Hydraulic Bulldozers and Backfillers are built along new lines—high lift—work well below the track—full floating action independent of tractor motion. Built for Monarch and Caterpillar Tractors. Hand operated models for small tractors.



Baker Rotary Scraper

Baker One-Man Rotary Scrapers

Built for any tractor in four models (13 to 40 cu. ft.) automatic draft control—no backing up to dump—large deep bowls—greater capacity for their width than similar scrapers. Unbreakable steel tongue.



Baker Road Maintainer

Baker Automatic Road Maintainers

Baker Multiple Blade Maintainers are built in 9 ft. and 12 ft. widths either with rubber tired or steel wheels. Scarifier attachment furnished when ordered. Trigger-speed adjustment of blade height unequalled on any other maintainer.

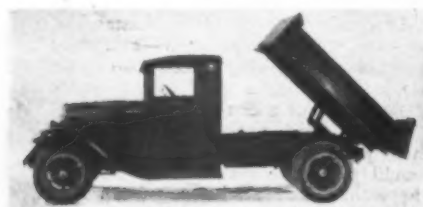
When writing to advertisers please mention ROADS AND STREETS—Thank You.

In addition, there will be a display of the new Stringalite safety electric lighting cable, which is being marketed by the Sullivan organization.

The company will be represented at St. Louis by the following: Howard T. Walsh, vice-president and sales manager; Joseph H. Brown, Chicago, manager compressor division; J. F. Berteling, Chicago, manager rock drill and hoist division; Don M. Sutor, manager St. Louis office; P. D. Cornelius, St. Louis sales staff; Hugh Durward, Kansas City sales staff, and by company representatives from Chicago, Knoxville, Cleveland and elsewhere.

Superior to Exhibit New Hydraulic Hoist

The Superior Body Corp., Marion, Ind., will exhibit its self dumper, hand hoist units and its new 5 in. underbody heavy duty hydraulic



New Superior Heavy Duty Hydraulic Hoist

hoist designed for use on all standard 1½-ton trucks. This hydraulic hoist is sold and designed for use with the new type Superior 1½-yd. body. The exhibit will be in space B-37, and will be in charge of J. B. Sisson, secretary-manager of the Superior Body Corp.

Timken Will Demonstrate Tapered Roller Bearings

The exhibit of the Timken Roller Bearing Co., Canton, Ohio, will occupy space B-23 at the Road Show. The feature of the exhibit will be a display to show the capacity of tapered roller bearings for carrying heavy thrust loads, as well as reducing friction. The display consists of a steel mill-type bearing, weighing about 500 lb., mounted at one end of a vertical shaft. The shaft is supported at the other end by a small bearing, which carries the whole suspended weight. The shaft is driven by a fractional-horsepower electric motor, using a fish line as a belt. In addition there will be an assortment of bearings of different sizes,

suitable for use in various types of road-building and maintenance equipment.

The company will be represented at the show by L. M. Klinedinst, vice-president, Canton, Ohio; R. P. Proffitt, district manager of industrial sales, St. Louis, Mo.; V. Steele, industrial representative, St. Louis, Mo.; G. D. Thewlis, district manager of industrial sales, Chicago, Ill.; J. W. Weir, district manager of industrial sales, Canton, Ohio, and G. W. Curtis, district manager of industrial sales, Milwaukee, Wis.

Extent of Texaco Paving Will Be Shown

The Texas Co., New York, N. Y., will have a special Road Show display, which will give an idea of the extent of paving with Texaco asphalt in the United States. In addition, material will be distributed covering the various kinds of road and street construction in which Texas products are used. The exhibits of the various companies belonging to the Asphalt Institute will be grouped together, and the booth of the Texas Co. will share this space, which is numbered A-125.

Titeflex Metal Hose Co. to Show Flexible Tubing

The exhibit of the Titeflex Metal Hose Co., Newark, N. J., will show a flexing and vibratory machine demonstrating the ability of Titeflex, the all-metal flexible tubing, to carry gasoline and oil under pressure. This material is used extensively throughout the road building industry for flexible gas and oil fuel lines on all motor driven power units.

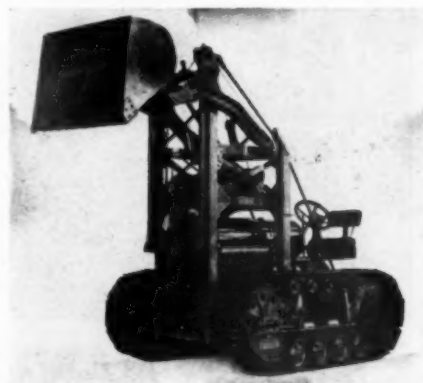
Trackson Equipment

The new Trackson Model GH crawler will be a feature of the Trackson exhibit at the 1930 Road Show. This crawler is the latest development in the Trackson line of tractor equipment. It is an entirely new machine with increased capacity, and with even greater adaptability than was afforded in previous models for the in-building of other equipment.

The Model GH is an all-purpose, heavy-duty crawler with a wide range of usefulness. It has plenty of power and traction to meet the requirements of drawbar work, and at the same time has the open design and wide clearances which

are necessary for the easy installation of graders, hoists, shovels, backfillers and other auxiliary equipment.

The Model GH crawler will be displayed at the Road Show equipped with the new Trackson high shovel, another important development of the past year. This



Heavy-Duty Trackson Crawler Unit with the New Trackson High Shovel

shovel is ideal equipment for the material-handling operations of highway builders, excavating and dirt-moving contractors, public-works departments and industrial concerns. It is both a digging and a loading unit, combining all the advantages of a low-lift shovel for digging and high dumping clearance for loading into trucks, etc.

Trackson crawler wheels, which are designed for mounting on wagons and trailers of various makes, will be displayed at the Road Show, in the 6, 10 and 15-ton sizes. Designed and built by crawler traction specialists, they are built of heavy alloy steel castings and drop forgings, and every part is generously proportioned.

The Model LH Trackson, which is a lighter and faster crawler than the heavy-duty Model GH, is also suited to the highway and contracting fields. It retains the standard traveling speeds of the wheel tractor, and is adapted to the installation of one-man graders, snow plows, hoists, etc. An LH crawler unit equipped with the Trackson hoist will be on display at the show. This combination will be of unusual interest to contractors because of the many advantages of a portable hoisting unit. The Trackson hoist may readily be converted from a single to a double-drum hoist, or vice versa. The auxiliary drum may be installed directly over the main drum whenever the user needs it, without any alterations.

The Trail of the "Road Hogs" Becomes a Passable Road



WARCO

POWER GRADERS HAVE:

- One-Man Control
- Roller Bearings
- Patented Head-Type Steering
- Choice of center or rear control models
- Three Sizes—Six Models
- Optional Tractor Power Unit
- WARCO Rear-Type Steel, or Rubber Crawlers interchangeable with rubber tired rear wheels
- I-Beam Frame; Enclosed Lifting Gears; Heavy, Cast Steel Circle, etc.
- Attachments including Independent Scarifier, Bulldozer, and Snow Plow



A remote mountain road, scarcely more than a trail becomes a passable motor road under the ministrations of this pair of powerful WARCO "Road-Hog" Power Graders. Shale-like rock is cut, and thrown out to make a smooth pathway for vehicles. We will be glad to tell you more about WARCOS. Get in touch with our nearest Distributor or write us direct.

Every Citizen is entitled to a passable road the year around. Why favor the few who live on main highways, when passable roads can now be provided for all, at costs within the reach of every community. Public Officials concerned with Road and Street problems, owe their taxpayers a complete investigation of WARCO Power Graders. Contractors, too, find WARCO Road Machinery a mighty profitable investment.

No longer need the whole neighborhood turn out to work the roads.

W.A. Riddell Company, Bucyrus, O.

Power and Drawn Graders - Wheeled Scoops - Rear-Type Crawlers for Tractors

The Trackson exhibit will be in space A-28. L. E. Dauer, sales manager; W. H. Stiemke, general manager, and other representatives of the Trackson Co. will be in attendance.

Trucktors Shown on Ford and Hug Trucks

The exhibit of the Trucktor Corp., Newark, N. J., at the Road Show will be a Ford truck equipped with the newest Ford Trucktor attachment. The Trucktor attachment consists of an extra pair of dual-tired wheels applied in front of the rear axle of the truck, a special

The Truscon steel post is made of $\frac{1}{8}$ in. special steel heavily galvanized after fabrication. The heavy steel hook wedge connection securely holds the wire cable at each post. The pressure of the hook on the cable is such that the shock is gradually taken up along the entire section. Heavy anchors attached to a dead-man give support at each end of the section and help absorb any shocks. The front of the post is rounded and the sides run back at an angle so that if hit by the hub cap the car will glance off. The cable placed out in front of the post tends to keep a vehicle from actually hitting the post and



Hug Roadbuilder with Trucktor Attachment

spring suspension system and special manganese-steel tracks. This unit gives the new Ford truck excellent performance in soft-ground operations.

The Hug Co., space B-35, will have a truck on exhibit equipped with the Trucktor system, as shown in the accompanying illustration. This company has found from experience that their Model 87-M truck equipped with the Trucktor attachment is an efficient unit for moving dirt on big projects, such as the Mississippi levee work.

Truscon to Exhibit New Products

The exhibit of the Truscon Steel Co., Youngstown, O., will be in booth A-6, in charge of B. C. Briody, vice-president and manager of the highway division.

In addition to its welded steel fabric, air cushion expansion joints, dowel contraction joints, curb bars, rib bars and steel road forms, two new products will be exhibited for the first time: Truscon all-steel highway guard posts and Truscon all-steel highway crossings.

resulting in dead impact as in most guard posts.

Truscon all-steel highway crossings consist of heavy, checkered-steel plates designed to withstand the heaviest loads, laid parallel to the rails and securely spiked in place. Standard plates are $\frac{1}{4}$ in. thick, $5\frac{1}{2}$ in. wide, 3 in. high and 9 ft. long, but any lengths up to 18 ft. may be provided. Plates are brought flush to the top of the rails by means of sleepers and electrical insulation is secured by the use of creosoted oak or asphalt as a filler between rails and plates.

Twin Disc to Show Variety of Clutches

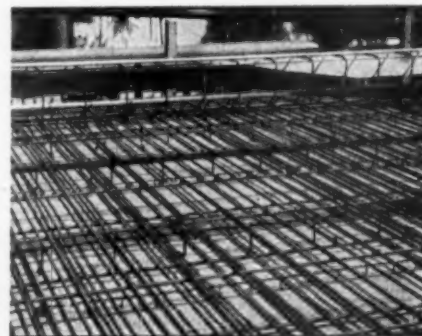
The Twin Disc Clutch Co., Racine, Wis., will exhibit in St. Louis a variety of sizes and types of clutches together with several different sizes of gear-reduction units and power-take-off units. Those of the Twin Disc organization who will attend are W. L. Dixon, eastern district manager; J. B. Jenkins, R. H. Smith and N. F. Adamson, sales engineers; P. H. Batten,

president; W. C. Gewalt, vice-president, and G. M. Guilbert, secretary and sales manager.

The number of the Twin Disc booth is B-57 and G. M. Guilbert will be in general charge of the exhibit.

Union Steel Products Exhibit

The Union Steel Products Co., Albion, Mich., will have its exhibit in booth B-73 with D. H. Bitney, sales manager, in charge. The com-



Hi-Chair and Slab Bar Spacers on a Bridge Job

pany will exhibit a new line of dowel bar supports, marginal bar supports, dowel sleeves, bar mat ties, tapered pins, mat supports, bar spacers and supports for bridges, beam wrapping, etc.

Bearium Metal Will Be Demonstrated

The Universal Bearing Metals Corp., Rochester, N. Y., the sole producer of Bearium metal, will, during the Road Show, demonstrate in an effective manner the non-scoring, non-seizing and long-life properties of this bearing metal. The metal is supplied in all forms, samples of its various forms being included in the exhibit.

Vellumoid to Feature Packing and Gaskets

The exhibit of the Vellumoid Co., Worcester, Mass., will feature Vellumoid sheet packing and Vellumoid ready-cut gaskets for applications on trucks, tractors, road machinery, etc. Vellumoid is a soft, fiber sheet packing made especially for work on oil, gasoline and water applications. It cuts easily with knife or shears, goes on without shellac and makes an absolutely tight joint that will stay tight.

RYAN

THE DIFFERENCE BETWEEN

RYAN Motor Controlled Grader.....**PROFIT**
Old hand methods.....**and LOSS**

in your grading operations.

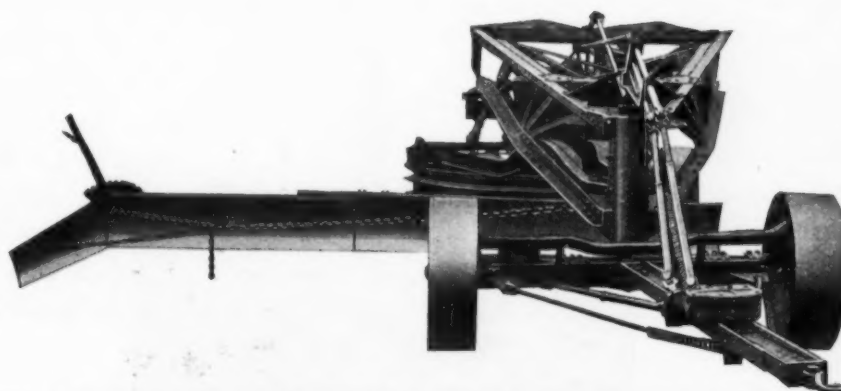


Road widening made easy with a Ryan

The RYAN Motor Controlled leanable frame grader will complete all your grading operations including backslopes, ditches and shoulders faster and easier than can be done by any other method, and will save you up to \$500 PER MILE on this type of work.

Let us prove it on your job

This new and inexpensive attachment which can be used only on the Ryan Motor Controlled Grader, will finish your shoulder work with little or no hand labor.



Ryan No. 12 Heavy Duty Grader with shoulder building attachment

SEE US AT THE ROAD SHOW—Space A-55

RYAN MANUFACTURING CORPORATION

13501 Baltimore Ave.

Chicago, Illinois

Please mention ROADS AND STREETS—it helps.

Waukesha Celebrates 25th Anniversary

The Waukesha Motor Co., Waukesha, Wis., is celebrating its 25th anniversary by a display at the Road Show at which an attractive new booklet, "Twenty-Five Years of Waukesha Progress," is being distributed. The Waukesha booth, B-167, is along the north wall of the exposition building B.

In a setting of unusual design, they are displaying a new six-cylinder engine of 300 to 325-hp. capacity which should be of unusual interest to large operators. Such an engine direct-coupled to a 250-kw. generator can furnish sufficient power to operate a large assortment of hoists, pumps, compressors, mixers, elevators and similar equipment, or for marine dredge work in single or multiple units.

These engines are of overhead-valve design with replaceable sleeve-type cylinders and controlled-turbulence combustion chambers. The model on display is equipped with gasoline carburetors and is shown with special flood-lighting arrangements to illuminate the attractive colors in which it is finished. This is the largest engine in the exhibit; it weighs 5 tons.

Another feature of the exhibit will be the Waukesha 90 to 100-hp. diesel engine displayed as a portable power unit, but built also for installation in excavators and all kinds of industrial machinery generally. The outstanding feature of this Waukesha diesel

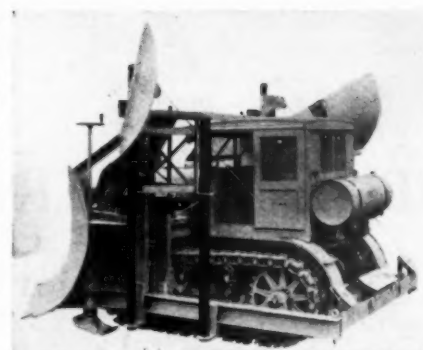
engine, from the operators' standpoint, is its interchangeability in mounting and power take-off with the standard Waukesha industrial engines of the same size. The engine is said to be unusually easy to start by a special system of manifolding and controls in connection with a small gasoline starting carburetor. On the diesel cycle, a Robert Bosch fuel-injection system is employed to handle the .25-.38 gravity fuel.

Besides these two larger units, a six-cylinder industrial unit of a new type will make its bow at this show. This unit is said to be built in sizes from 20 to 50 hp. in both fours and sixes.

A number of other interesting features will be on display at the booth, which will be attended by the following factory representatives: J. M. Boorse, L. L. Bower, F. W. Gargett, H. V. Kilpatrick, J. A. Mahoney, P. C. Ritchie and J. G. Swain.

Wausau Snow Plows

The Wausau Iron Works, Wausau, Wis., will exhibit at the show; this company states that the entire Wausau line has been rebuilt, incorporating advanced features. The Model 60-M plow is shown in the accompanying illustration. This plow, it is stated, can be detached from the tractor in 5 minutes. The wings can be tilted at any angle, either up or down, and will be fully extended at any elevation. The plow itself can be tilted if desired. The plow is car-

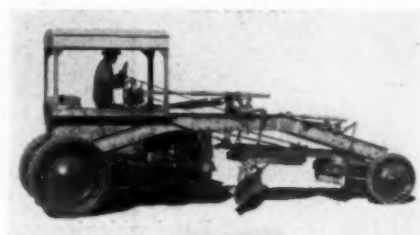


Wausau 60-M Improved Snow Plow

ried entirely on springs, mounted over the center of the track. A new type of spring-mounted shoe cushions the plow at all times. This saves wear on the cutting edges.

Wehr to Show New Power Grader

Wehr Co., Milwaukee, Wis., will exhibit a new very heavy type power grader, called Model Z, which uses either the McCormick-



Wehr Model Z Power Grader

Deering Model 30 tractor or the Case Model L. I. tractor. This is a very heavy grader for fast maintenance work and weighs in the neighborhood of 18,000 lb.

The company also will exhibit its Model U grader, which is a rear control type machine, used with the Model 20 McCormick-Deering, Case Model C. I. and Model U Industrial Allis-Chalmers tractors.

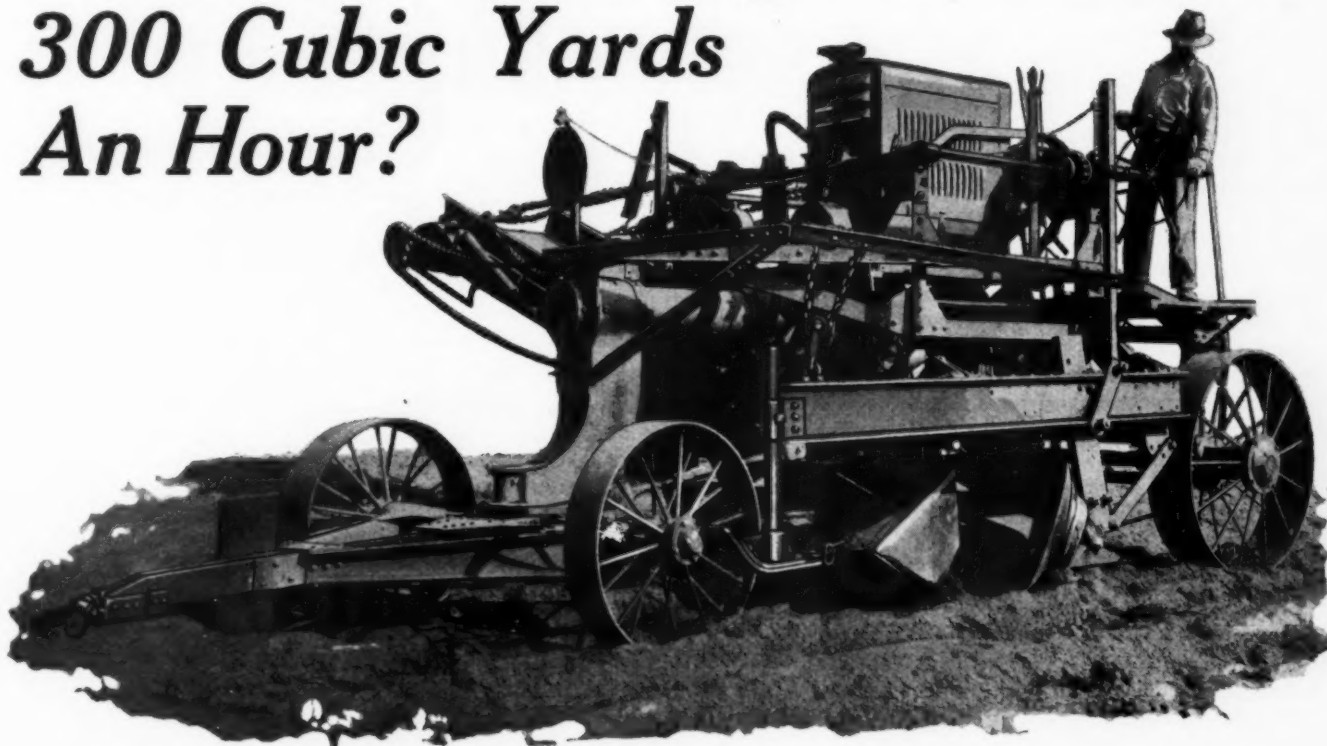
The center control Model A grader, which is used with the Model 20 McCormick-Deering tractor, Model C. I. Case and Model U Industrial Allis-Chalmers tractor will also be exhibited with Wehr Model J crawler equipment. This new Model A grader with Model J crawlers is a new development put on the market about four months ago.

The company also will exhibit one of its road rollers and the Wehr all-purpose cleated wheel.



New Waukesha Six-Cylinder Power Unit, U Series

Will Your Elevating Grader Load 300 Cubic Yards An Hour?



The New Western No. 6 Does It

In actual roadwork it has loaded 17,800 cubic yards of pay dirt in 60 hours.

This new elevating grader will be shown for the first time at the Road Show in St. Louis, January 10-17, Booths A-25 and A-43.

A radical departure in elevating grader design is the three point suspension of the frame. This eliminates distortion and the resulting ills of "floating" belt and racking the frame. This type of construction makes turning easier.

The backbone of the frame is a tubular member of great strength. The belt is driven by a motor mounted on the machine. These and other features give the Western No. 6 the strength and flexibility to handle an enormous yardage.

You will want to see this new machine at the Road Show and the moving pictures of it in operation. However, if you do not attend our bulletin No. W-31-CQ, just off the press, gives a complete description. Write for it today.

Western Wheeled Scraper Company

Dump Cars and Grading Equipment

Aurora, Illinois, U. S. A.

WESTERN

West Process Pavement Co. Exhibit

The West Process Pavement Co., Louisville, Ky., will have a display in Booth A-78 and in addition to their already well known hot-lay Westphalt will exhibit two newer products, cold-lay Westphalt and Westphalt retread, the latter being especially intended for the secondary highway system. In addition to moving pictures showing the methods connected with laying of Westphalt and still film projection of Westphalt jobs in various parts of the country there will be a mechanical innovation showing the great resiliency of Westphalt. Outside of the arena will be a model plant to demonstrate both the projection and heating of Westphalt. W. C. West, president of the company, will be in charge of the exhibit.

Western Metal Specialty Co. Will Exhibit Many Products

The Western Metal Specialty Co., Milwaukee, Wis., will exhibit the following products at the Road Show: truck fenders, guards, truck hoods, cowls, dashes, mufflers for



Fuel Tanks Manufactured by Western Metal Specialty Co.

stationary engines, engine housings and welded and soldered fuel tanks. Some of the fuel tanks to be exhibited are shown herewith.

Exhibit of Western Wheeled Scraper Co.

The exhibit of the Western Wheeled Scraper Co., of Aurora, Ill., at the Road Show, Booths A-25 and A-43, will be confined to a few new Western machines.

An entirely new Western elevating grader will make its first appearance in public. The basis of this new elevating grader is a 12-in. tubular "backbone," giving enormous strength with minimum weight. A separate power unit is

used for elevating the dirt after reaching the belt. Without going further into mechanical details, it is sufficient to say that the individual machine to be exhibited at the show has a record of actual roadwork of 17,800 cu. yd. of pay dirt in 60 hours, delivered into wagons and hauled from a borrow pit. Moving pictures of the work will be shown.

A Western crawler dump wagon with direct hitch and equipped with the new Western spring wind-up also will be featured. This spring wind-up is simplicity itself. The doors can be tripped and wound up by either the tractor driver or the dump man, thus relieving the regular wagon man for other work.

A third new Western machine, to be shown for the first time, is a rotary fresno of 2-cu. yd. capacity, strike-off measure, designed and built to utilize the full power of a 60 to 75-hp. tractor for moving dirt. The operating principle is similar to that in the smaller sizes of

and a new development in motorized mechanical drives—a multi-speed gear unit and motor assembled as one unit—will be shown. This equipment will be in operation.

The Westinghouse company will be represented at the show by members of its headquarters and field sales organizations.

Wiard Plow Co. Will Exhibit Complete Line

The Wiard Plow Co., Batavia, N. Y., will be in space A-64A. They are not offering any new tools this year, but will have on display their full line of contractors' equipment, including plows, grade rippers, scarifiers and scrapers.

White Trucks Exhibit

The White Co., Cleveland, O., will exhibit three trucks especially designed and engineered for con-



White Model 63 Dump Truck

Western rotary fresnoes, except that all operations are controlled by the tractor driver by means of a single rope. When the scraper has secured a full load, the drawbar pull of the tractor is automatically utilized to pull the cutting edge out of the ground and into carrying position. This is a cut-and-carry tool that will permit highway officials and road contractors to utilize their large tractors.

Westinghouse Electric & Mfg. Co. at Road Show

At the 1931 Road Show in St. Louis the exhibit of the Westinghouse Electric & Mfg. Co., in space B-47, will consist principally of Westinghouse-Nuttall gearing apparatus. Miscellaneous cut-tooth gearing used in various kinds of construction equipment, speed reducers

struction and maintenance work and for freight and long distance hauling.

The exhibit, in space B-16, in the north exhibition building, will include the following:

White Model 64, a 6-cylinder chassis of 157-in. wheelbase, for heavy duty dump trucks and for tractor-trailer operations. This is an extremely powerful heavy duty chassis with a 100-hp. engine of the 6-cylinder overhead valve type with seven-bearing crankshaft, 4 $\frac{3}{8}$ -in. bore and 5 $\frac{3}{4}$ -in. stroke, giving a piston displacement of 519 cu. in.

White Model 63 with Wood hoist and dump body, having two swinging partitions to carry dry batches. The Model 63 is powered with a 6-cylinder, overhead valve, seven-bearing crankshaft engine

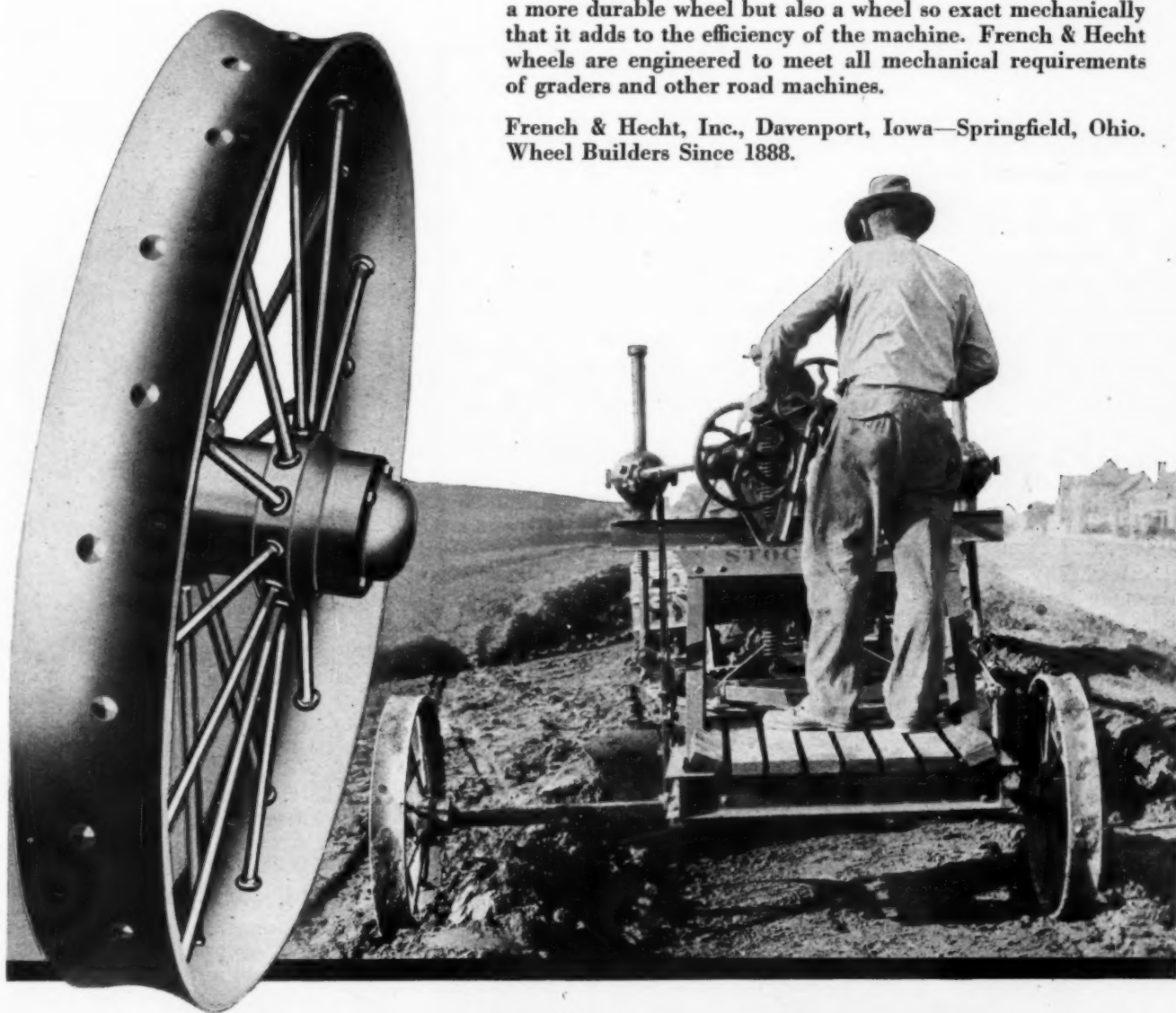
The Builder of Highways...

In addition to their great strength and rigidity all French & Hecht Wheels are mechanically accurate for ROUNDNESS, TRUENESS and BALANCE.

DESPITE the wide diversity in road building machinery, certain uniformity and standards are evident. Here French & Hecht Service, specializing in wheel design and manufacture, since the beginning of the industry, has played an important part.

French & Hecht construction assures not only a stronger and a more durable wheel but also a wheel so exact mechanically that it adds to the efficiency of the machine. French & Hecht wheels are engineered to meet all mechanical requirements of graders and other road machines.

French & Hecht, Inc., Davenport, Iowa—Springfield, Ohio.
Wheel Builders Since 1888.



FRENCH & HECHT

STEEL WHEELS

Yes—we would like you to mention ROADS AND STREETS

with a bore and stroke of $4 \times 5\frac{1}{4}$, giving a piston displacement of 396 in. A range of five ratios is available to meet any type of hauling requirement.

White Model 212 will be equipped with a No. 2 Heil hoist and 2-yd. dump body. This model is a 4-cylinder chassis particularly adapted to work where a fast, small capacity truck is needed.

The White Co. will be represented by Saunders Jones, vice-president and assistant to the president; George F. Russell, vice-president and sales manager; W. A. Maynard, sales promotion manager; H. P. Starbird, in charge of exhibit, who will be assisted by J. N. Bauman, R. J. Logan, C. I. Fraley, R. E. Laisy, R. S. Lapham, G. R. Bryan and R. J. Soulen.

Wickwire Spencer Will Present Several Products

The exhibit of the Wickwire Spencer Steel Co., New York, N. Y., manufacturers of electrically-welded reinforcing fabric, in Booth A-100, will cover several important products used in road construction. There will be a display of Clinton electrically-welded fabric, used in reinforcing concrete construction; a reel and panels of Wickwire Spencer wire rope, and several sections of Wickwire Spencer chain-link road guard.

Those in attendance will be T. H. McSheehy, New York, N. Y., manager of structural products sales; L. P. Smith, Buffalo, N. Y., district sales manager, and A. A. Wilmot, Chicago, assistant sales

manager in charge of structural products.

Willett to Exhibit New Truck-Grader

Many unusual and advantageous features have been built into the new Willett truck-grader to be shown by the Willett Mfg. Co., Grand Rapids, Mich., in spaces A-82 and A-86, exhibition building A, at the Road Show. These special features are an outstanding development in speed maintenance equipment which promise that this exhibit will be of real interest to highway engineers. The regular line of Willett spring-scrappers will also be on display.

G. H. Williams to Feature Trailer and Bucket

The exhibit of G. H. Williams Co., Erie, Pa., will feature the improved Williams Arch-Girder trailer and also the 1931 Williams Champion clamshell and Williams Double-Arch dragline buckets.

The improved Williams Arch-Girder trailer to be displayed will show even greater strength than the previous type, without added weight. Other improvements include the "shock-proof" rear end; lower loading point at rear; reinforced "arch-girder" front end; oversize Timken bearings for easier running, etc.

The Williams Champion bucket will have new improvements that add to the digging efficiency, while the unique tandem arrangement of sheaves on the power arm makes a straight-line closing pull possible, conserving the power for actual digging.



New Willett Truck-Grader

The Williams exhibit will also include a Williams Double-Arch dragline, with an arch bridge across the top and a heavy arch digging lip below, giving positive insurance against pulling in at the sides in the hardest kind of dragline service.

The Williams display will be in Booth A-52 and will be in charge of the following members of the organization: W. C. Swalley, A. J. Lichtinger, C. F. Weiblen, P. T. Robin, G. S. Swanson and H. B. Ackland.

Williams to Show New Vibrating Screen

The Williams Patent Crusher and Pulverizer Co., St. Louis, Mo., will exhibit its hammer crusher, Super-Jumbo and Jumbo Junior type. It also is planned to show a new Kam-Tap vibrating screen.



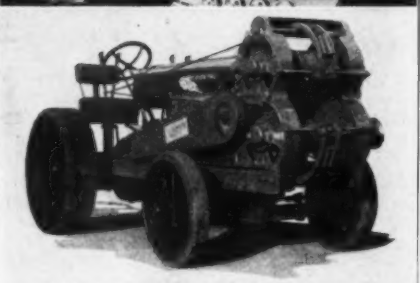
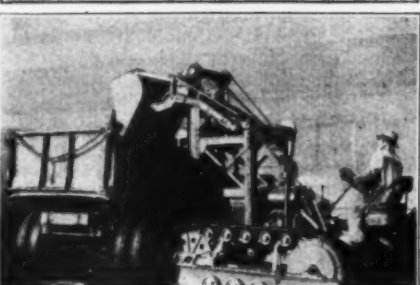
New Kam-Tap Vibrating Screen

This screen has been in process of development for some months but has just recently been offered to the trade. It is built in one, two or three deck types and the manufacturers recommend it for handling any screening operation from 200-mesh fineness to the screening of gravel, crushed rock, etc. For the heavier work the machine is of course built very substantial.

Young to Show Radiators

The Young Radiator Co., Racine, Wis., will occupy space B-114, exhibition building B. The company will exhibit radiators for cooling diesel engines, several types of truck radiators, sectional type radiators for air compressors and various machines. Small stamped sheet metal type radiators for power units as well as new type space heaters and oil coolers, also will be shown.

POWER FOR PROFIT



LOWER COSTS in road building and contracting during the new year are going to require something more than the usual good equipment. Equipment will have to be not only good but widely adaptable — suited to the greatest number of different jobs. After a machine, let us say a bulldozer, has done its usual work, it will have to drop that attachment and keep on going with some other.

■ That will be an easy matter for such Trackson Equipment as bulldozers, shovels, trench rollers, etc., for each uses the same hoisting assembly and is therefore interchangeable with the other. On many operations one Trackson Crawler Tractor with two or more of these attachments is essentially the equal of the same number of complete units. The short time required for change-over is negligible compared to the saving effected thru lower investment, less depreciation and the continuous use of one machine.

■ All Trackson Equipment has been designed with this utility end in view. The crawlers have been designed to provide plenty of room for the easy and secure attachment of equipment. No matter which attachment is used the drawbar is always available for duty. Let us suggest the combination of equipment that will bring you lowest costs. Trackson Company, 1320 So. First St., Milwaukee, Wis.

ROAD SHOW BOOTH A-27

TRACKSON

TRACTOR EQUIPMENT



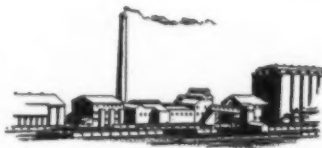
Distributor News

Southern Industrial Plant to Serve Contractors Completed

Rogers & Leventhal, general contractors, recently turned over two huge buildings to the Simplicity System Company of Chattanooga, Tennessee, which they had completed under contract to the manufacturers at a total cost of \$100,000.

The plant is located at Riverside drive and Sholar Avenue, and the buildings are said to be among the most modern in the entire South. The first buildings include the initial unit of the factory and the office building. The Simplicity Company will manufacture contractors' equipment and is said to be the first factory in the south devoted exclusively to the manufacture of this line.

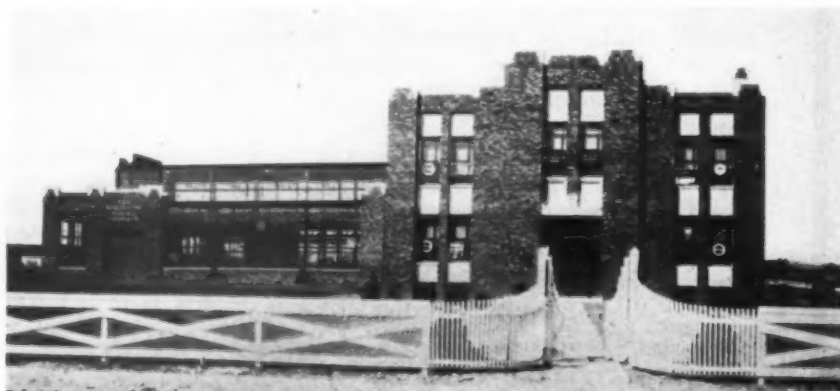
The site occupies eighteen acres and it



O. White, vice-president and sales manager, and E. M. Kelley, cashier, and is engaged in state highway contract work in Florida and Arkansas.

The old West Construction Company, under the management of Larry B. West, president, which has been located in Chattanooga for the past thirty years, will occupy offices in the new building.

The asphalt plant takes its name from the fact that it is designed along simple lines, and with the new factory now fully equipped and in operation Simplicity is ready to meet any market requirements.



Modern Office Building and Engineering Department of Simplicity System Co.

is believed that this pioneer industry will continue to grow and give employment to increasing numbers of mechanics, where forty workmen are now employed.

The Simplicity asphalt plant manufactured by this company is understood to be the result of eighteen years of careful design and manufacturing experience of the chief engineer, M. P. Wall, who with William C. West, vice-president will manage the industry aided by O. C. Schweiger, J. T. Reed and C. L. McAllister. The officials of the company believe that Chattanooga is ideally located for the industry because of the availability of supplies at that point needed for the manufacturer of contractors' equipment.

In addition to the engineering and sales department, the office building will house several companies with allied interests. The West Construction Company of North Carolina, engaged in large road building operations and under the management of A. K. Barrus, will occupy space in the building. W. C. West is vice-president and H. L. Rush, cashier of this company. The Wesco Company is another organization occupying offices in the building. This is a large Tennessee contracting company, under the management of M. N. Leventhal, president; L. W. McGinty, assistant treasurer; M. Russ and Jake Rubin, managers.

The West Construction Company of Tennessee will also occupy space in the office building. This company is headed by Alexander J. White, president; George

charge of government inspection and procurement of steel castings for ordnance work west of Philadelphia. His association with the Fort Pitt Company was for the eleven years immediately following the war. A picture of Mr. Lynch is shown in the Who's Who feature of this magazine.

French & Hecht Operate Employees Aid Assn.

Among the many active employees aid groups operating to meet the unusual business conditions is the one known as the French & Hecht Mutual Aid Association. This association was formed forty years ago, the original plan being to aid the employees in case of illness or accidents which resulted in termination of wages.

By slightly modifying the original plan the association has arranged to take care of every worthy workman who has been in the employ of the company during the past year and who may need aid due to the present unemployment situation.

An assessment of 1 per cent of actual weekly earnings is made on every employee on the payroll—a workman earning \$20 contributing 20c—and the firm of French & Hecht adds a sum equal to the total amount collected from employees, in other words doubling the amount of the employees assessment. The fund is administered by a committee of workmen who pass upon each case. Food, clothing and fuel is distributed. The transaction is considered in the light of a loan to be repaid to the Association (without interest) at such time as the beneficiary returns to normal employment and is able to make the return. The company is not reimbursed for the amount contributed by them, the entire amount being returned to the Mutual Aid Association.

It is stated that since the organization of this association sick and accident benefits amounting to approximately \$100,000 have been paid out. In case of death modest assistance has been rendered.

A New Arrangement

The interest of T. A. Murray of the Wheeler-Murray Company of Buffalo, New York, has been taken over by L. M. Wheeler, according to recent announcement, although the business will continue to be operated under the same firm name. The Wheeler-Murray Company, located at 329 Ellicott Street, handle a large line of construction and industrial equipment.

Charles A. Lynch Made Official of Foote Co., Inc.

Announcement has recently been made of the appointment of Charles A. Lynch as vice-president and general manager of the Foote Company, Inc., of Nunda, New York. Mr. Lynch is well known in the steel castings industry and for the past five years has been engaged in an intensive study of machinery and equipment materials. For twenty-three years he has been identified with the industry, and formerly served as manager of engineering and sales for the Fort Pitt Steel Castings Company, McKeesport, Pa.

During the World War Mr. Lynch was stationed at Pittsburgh where he had



New Simplicity factory. Louis H. Bull, architect; Rogers & Leventhal, contractors. Erected plant shown at left ready to produce

New Sullivan Equipment

at the Road Show
will point the way
to a profitable 1931

1931 will be a good year for alert road builders. And many contractors will study exhibits at the Road Show, for means of reducing estimates and increasing profits.

Three of the eight Sullivan Vibrationless compressors will be on exhibit. They are becoming the standard source of dependable air power. A Sullivan Portable All-Hammer drill sharpener will make precision bits and shanks for the crowd which always gathers about it.

New concrete breakers and rock drills—a new anti-freeze system for pneumatic tools—new Stringalite portable lighting cable—a pavement core drill—and a Turbinair hoist will be on exhibit in the

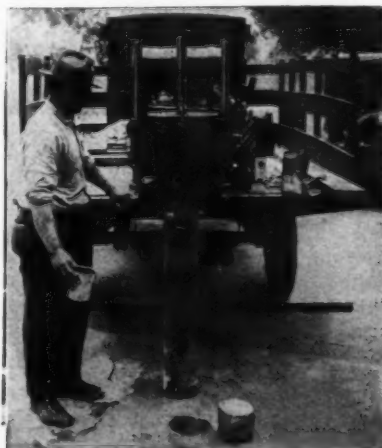


Sullivan Booth, B-39, in the north end of the west building. See these products at the Show, or send for the Sullivan Road Show Bulletin.



**New Sullivan
Busters**

Three new Sullivan Busters will be on display in St. Louis. Also Spaders, and several Rock Drills. These tools will be operated in the booth.



Sullivan Pavement Tester at Work



**Tanner-Tank
Anti-Freeze**

Don't fail to see the new Tanner Tank. It absolutely prevents freezing of tools or air lines at 40 degrees below zero. It peps up tools in warm weather. Obviates need of fires on air lines, and alcohol dripping. Bulletin on request.

Sullivan Offices

Birmingham, Ala.
Boston, Mass.
Butte, Mont.
Chicago, Ill.
Claremont, N. H.
Cleveland, Ohio
Dallas, Texas
Denver, Colo.
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St. Louis, Mo.
Terre Haute, Ind.
Toronto
Vancouver

Superior Supply Holds "At Home"

Following a yearly custom the Superior Supply Company of Chicago recently held a party for their contractor friends. Good fellowship was the keynote, and musical entertainment and refreshments for the inner man served up between rows and rows of the equipment which this company dishes out to meet the needs of their guests when not on a holiday.

Superior handles a large line of well known equipment which fits into all branches of the civil engineering field engaged in road and street work, water works and sewerage systems and big-job construction. John Schniedwind, the engineer responsible for the arrangement of the machinery, had so placed it that the man interested in any particular type of work could go down a lane and see just what was needed in the way of equipment and tools for the job.

"Bridges and Culverts" offered as a part of that display a steel erector hoist, pile driving hoist, compressor, saw-rig, rivet forge, mixer equipped with heater, force pump and tools. Following this "layout" came that for buildings, including, the double-cage tubular material tower, the big compressors, the plaster mixer, weighing hoppers, pumps, building hoists, Tanner gas tanks, carts and wheel-barrows, air hoists and every sort of tool for the workmen, and to show that the tarpaulin covers were really water-proof they contained little pools of water in which floated gold fish.

"Sewers and Water" served up an interesting lot of equipment for the water works man, where every piece was displayed so that it could be thoroughly investigated. There was the large excavating bucket; the flood lights; trench braces and pipe jacks; saw rig; and mortar mixers for the big brick sewers; well points, header line, hose and plunger pump; man hole forms and block and tackle.

"Roads and Pavements" was the title used for the display of highway outfits. Here was stretched the long burlap covers; the aluminum straight edge; the perforated rollers, and the finishing machine for the concrete roads and pavements. The rollers (the one displayed was 5-ton); road forms, curb forms, gutter forms; the grade rooter and the trail grader; the 28-ton trailer; the 1-yd. paver; shovels and cranes; expansion joints; wire rope and lubricants and the single and double scale hopper for weighing and filling the wheel barrows with sand and gravel.



Equipment for building bridges and culverts. Interior view at plant of Superior Supply Company

The Superior Supply Company is located on the southwest side of Chicago, at 1850 South Kostner Avenue. Under roof their plant occupies approximately 33,000 square feet, with a railroad switch coming right into the building. The outside yard covers about 10,000 square feet. Requirements of contractors for northern Illinois and northern Indiana are supplied from this plant.

Superior represents such well known manufacturers as Clyde Iron Works; Chain Belt Company; Butler Bin Company; Northwest Engineering Co.; Rogers Brothers Corporation; Sullivan Machinery Company; Lakewood Engineering Company; Page Engineering Company; Heltzel Steel Form and Iron Company; Novo Engine Company; Waukesha Motor Company; LeRoi Company; Templeton, Kenly Company and many others all equally well known but too numerous to list.

Officials of the Superior company are Will R. Sostheim, president; John H. Erby, secretary-treasurer, and Mark Kaplan, sales manager. The organization is now ten years old and is a member of the Associated Equipment Distributors.

Novo Engine Company, Lansing, Michigan, announces the appointment of A. E. Hudson Company, 311 Franklin Street, Peoria, Illinois, as distrib-

utors for the Novo products. It is stated that the distributing company will carry a full line of products and repair parts.

Good Will Fund

Because of conditions arising out of the business depression, a small group of salaried executives of the Continental Motors Corporation, of Detroit and Muskegon, pledged the payment of a certain sum each month for five months, to be administered by a small committee at each of the company's plants, to directly aid their co-workers in need.

An invitation was extended by this group to all salaried employees to participate in contributing to this fund, with emphasis on the point that all contributions should be wholly voluntary.

The Board of Directors of the corporation voted to assist the fund at both plants with a substantial monthly contribution in recognition of the spirit of initiative and good will displayed, and a desire to aid in this practical method of extending direct relief to employees of the corporation in need of assistance. The funds are administered entirely by a committee of employees. The recipients of aid from this fund are under no obligation and repayment is not expected.



J. HENRY WARREN
President
Warren-Knight Company
Philadelphia, Pa.



A. J. FILLIEZ
General Manager
The Fudom Hoist & Shovel Co.
Lima, O.



A. W. WARR
President
Master Equipment Company
Los Angeles, Calif.

**“HEAVY TRAFFIC”
Pavement
at “LIGHT TRAFFIC”
Costs**

*The new way to stretch
your paving dollars . . .*

Bit-u-muls

DURABLE rock pavements, with live, sticky asphalt to waterproof and bind them . . . Bitumuls construction now offers you “primary-road” quality at “secondary-road” prices.

Rock particles are interlocked as in hot penetration macadam, and thin coatings of asphalt are obtained as in closely controlled and more expensive hot plant mixed asphaltic concrete.

Yet, there are no heating costs whatever. And only simple equipment is required to construct Bitumuls. Application may be with the popular types of gravity or pressure distributors, or with ordinary pouring pots.

Longer Construction Season

Applied at any atmospheric temperature except freezing weather . . . and in damp, or even mildly rainy weather . . . Bitumuls non-skid paving also adds

many months to your construction season.

Voids are reduced to a minimum. And, because the use of excess asphalt is eliminated, there is no shoving and surface bleeding.

If you are interested in stretching your paving dollars . . . for secondary road construction, primary roads, city streets, subdivisions, widening, resurfacing, maintenance, and airports . . . investigate Bitumuls low-cost construction. It is backed by years of extensive research and widespread use throughout the world.

For “heavy traffic pavement at light

traffic costs” . . . be sure that your specifications measure up to Bitumuls.

Technical data, detailed facts, and specifications available in the Bitumuls Manual. Mail the coupon for a free copy.

Make this practical test

Order a sufficient number of barrels of Bitumuls to make a thorough test. Have your regular paving crews apply it . . . in small areas . . . with ordinary gravity or pressure distributors, or with pouring pots. See for yourself the amazing possibilities of Bitumuls in your pavement construction and maintenance . . . its low cost . . . its durability . . . its non-skid surface.

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Please mail me your free manual . . . without obligation

Name _____ Address _____

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Livingston to Represent Ateco in East

N. G. Livingston, well known on the Pacific Coast and in the Southwest for his knowledge of earthmoving equipment, has been appointed Eastern sales manager for the American Tractor Equipment Company of Oakland, California, according to recent announcement of the company president, Edward R. Bacon.

Mr. Livingston will operate from the Peoria, Illinois, plant of the company where a complete stock of the Ateco products are carried to serve the needs of the Eastern, Southern and Mid-Western states. His many years in field work with all kinds of construction equipment and his success with the Ateco line of dirt-moving products afford a clear insight into the problems of both user and dealer.

H. W. Fletcher to Head New Orleans Co.

Harry W. Fletcher, one of the outstanding figures in the building and road equipment business in the country, and a past president of the Associated Equipment Distributors, has organized the Fletcher Equipment Company, Inc., to take over the interests of Clyde Company, Incorporated.

In announcing the change, Mr. Fletcher declared that the policies of the old company would be continued and the same standard lines of equipment, representing some 28 manufacturers, will be carried. The old 24-hour service schedule will be maintained, and it is stated that practically everything required in the building and paving contracting fields and by material dealers will be carried in stock, excepting only such equipment as must come direct from the manufacturer.

The new organization will continue to occupy the four story structure at 309 Magazine Street, the former location of the Clyde Company, which has a floor area of some 20,000 square feet.

Mr. Fletcher entered the equipment business 23 years ago as a sales representative of the Clyde Iron Works, and was instrumental in the formation of the



Meet Mr. Livingstone—He must be a traveling man

Clyde Company in New Orleans in 1925, which he served as general manager.

In speaking of the new arrangement, Mr. Fletcher stated: "Business never looked brighter. Now is the time to take advantage of a period of readjustment, and in the face of existing enormous building programs, the more noticeable in Louisiana, I believe we are at the beginning of a long upward pull that will terminate with a new industrial era in the South."

The lines of equipment handled by this company include Rex, Clyde, Link-Belt, Sauerman, Butler Bin, Barber-Greene, Archer Iron, Byers, Bay City Foundry, Freeman Manufacturing, Hug, LeRoi, Leschen, M. & M., Owen Bucket, Sterling Wheelbarrow, Sullivan, Templeton, Kenly, Toledo Pressed Steel, Waukesha, Woods Shovel, and others.

Announcement

Frederick O. Anderegg, formerly associate professor of physical chemistry at

Purdue University and more recently senior industrial fellow at the Mellon Institute of Industrial Research in charge of investigations of Portland Cement and masonry has announced the opening of a consulting practice on building materials. His offices will be located at 206 Fulton Building, Pittsburgh, Pa.

Theodore Eichhorn

In the passing of Theodore Eichhorn, past president of the International Association of Public Works Officials, the organization has suffered a severe blow, for he was one of the founders through whose wisdom, patience and vision the organization was carried through an early struggle for existence, according to a statement issued by Elmer C. Goodwin, president of the Association, following Mr. Eichhorn's death.

Mr. Eichhorn's death occurred November 23d, following an illness which for the past two years kept him away from the annual conferences of the Association which he fostered.

Chicago Warehouse for American Hoist & Derrick Co.

Warehouse facilities in Chicago have been purchased by the American Hoist & Derrick Company in order to carry complete stocks of new machines and repair parts for the prompt service of users of their hoisting machinery. Chicago offices will continue to serve the trade from 205 W. Wacker Drive.

Transit Mixers Association to Meet in St. Louis

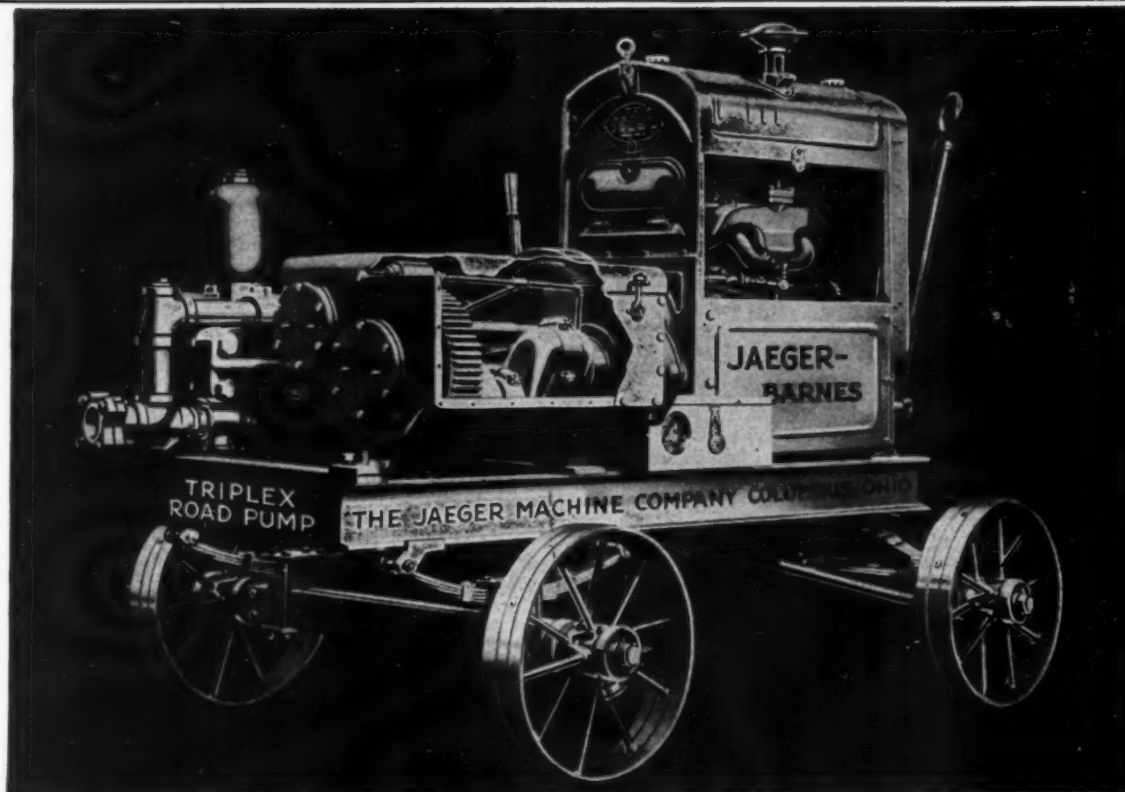
January 9th and 12th, inclusive, are the dates announced for the meeting in St. Louis of the National Association of Paris Transit Mixed Concrete Manufacturers. The convention will take place at the Marquette Hotel.

Speakers from the National Sand and Gravel and Portland Cement Associations will address the convention, and A. Knowles and Hugh P. Paris, inventor of the Paris Transit Mixer, are announced to appear on the program.



Left to Right: R. T. McClelland, Vice-President, and C. E. Kratz, President, of Kratz & McClelland, Inc., San Francisco, Calif.

The ROLLS-ROYCE of ROAD PUMPS



ENGINEERED to Give Unfailing Water Supply . . . TESTED and PROVEN on a Thousand Jobs!

ONLY fully self-oiling road pump with roller bearings on all shafts. Simplest oiling system, with patented, positive, rotary oiling pump. Every part works in dust-proof case.

Steel cut gears and pinions, unbreakable forged crankshaft, detachable cylinder block casting, removable cylinders, pistons hardened against

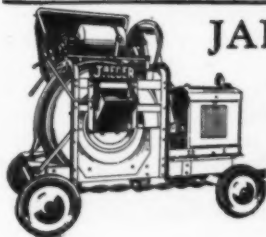
wear. Reinforced steel trucks, semi-elliptic springs, automotive type front axle with steering knuckles.

Horizontal design provides better automatic lubrication, easier inspection of all parts. And more than 100 Jaeger stations assure quick service anywhere.

FORCE PUMPS—SELF
PRIMING CENTRIFUGALS

JAEGE-BARNES

PLUNGER TRENCH PUMPS
CONVERTIBLE DIAPHRAGMS



JAEGE 10S MIXER

All steel, short coupled, direct driven, handles like a 7S, gives heavy duty 2-bag service.

Other non-tilts 7, 14, 21, 28, 56S. Tilters 3½, 5, 7, 10S size.

Ask about "Jiffy" Placing Plant for Conveying and Hoisting.

JAEGE MIXERS...PUMPS... HOISTS — Information Slip

THE JAEGER MACHINE CO., 223 Dublin Ave., Columbus, O.
Send catalog, prices and full data on—
() Jaeger-Barnes Pumps () Jaeger Mixers () Hoists

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Address _____

Do you mention ROADS AND STREETS when writing? Please do.

Service Exchange for Manufacturers or Distributors

Editor's Note.—From time to time we receive letters from distributors wishing to be put in touch with manufacturers of certain lines of equipment, or from manufacturers seeking representatives of their products. Items of this kind will be published and names and addresses furnished interested persons upon request.

New Lines Wanted

Equipment distributor covering New Jersey, Delaware and eastern half of Pennsylvania in position to handle line of gasoline pumps, diaphragm, centrifugal, etc., 2 to 35 hp.

Wanted line of picks, sledges and crow bars, spades, shovels and similar implements by New Jersey broker, with warehouse facilities, contacting New York and New Jersey jobbers.

Wanted agency for any type of building specialties or contractors' machinery except mixers. Twenty years experience. Familiar with all types of contractors' machinery. Could act as sales manager for Atlantic Coast line with dealers.

Distributor covering Wisconsin and Illinois territory wishes to add to present lines. Thoroughly familiar with bituminous materials and equipment for handling.

Wanted line of street markers or other traffic equipment on exclusive basis by distributor covering New Jersey and New York territory.

Warehouse facilities for serving Pittsburgh territory. Would like to secure line of portable and stationary conveyors.

Southwest and Middlewest distributors wanted by manufacturer of metal lath, corner beads, channels and reinforcing mesh.

Representative in Northwest desires to handle, on commission basis, line of road building and maintenance machinery, revolving scrapers, tractors, rotary snow plows and V push plows.

Equipment distributor in Pacific Northwest desires line of road building equipment, structural building equipment, dump bodies and truck hoists.

Wanted exclusive sales rights for state of Mississippi for line of automatic or self-loading wheeled scraper.

Michigan distributor would like to add two or three good lines to serve territory in southwestern part of state.

New York state distributor would like to add two or three lines to serve his territory.

Machinery distributor, established in Porto Rico and Santo Domingo, would be pleased to make arrangements to take on new lines in these territories.

Distributor located in Portland, Oregon, desires line of stationary diesel engines, from 75 to 150 hp. to serve western trade for driving rock crushers and industrial plants.

Distributor located in Virginia wishes to make connection to represent manufacturer of manganese crushing plates and jaw rock crushers.

Export manager for American manufacturer of road graders is in a position to handle an additional line of non-competing construction machinery, for manufacturer seeking foreign representation.

Manufacturer's representative located in New York City, now handling pumping machinery, would like to take on two or three additional lines serving the same field as his present account.

Diesel engine account, road building material and equipment line, and industrial equipment and materials seeking representation in south wanted by Florida distributor. Large warehouse facilities.

Representatives Wanted

Manufacturer of special corrosion preventing lubricant for road machinery and construction equipment wishes to establish distributing points throughout the country.

Manufacturer of contractors and builders levels and transits is seeking district sales manager. Exclusive contract given. Excellent territory still available. Backed by national advertising.

Manufacturer of complete line of construction equipment, mixers, saw rigs, plaster and mortar mixers and pumps has an open territory in the state of Maine and is looking for an aggressive distributor to represent him there.

Long established and well-known manufacturer of industrial locomotives wishes to make contacts with qualified distributors. Locomotive line includes steam, gasoline, gas-electric and oil-electric. Supported by national trade journal advertising.

Manufacturer of patented luminous highway danger signs and signals is interested in securing aggressive representation in various parts of this country and Canada.

California territory available for distributor wishing paving expansion joint account.

Good, unassigned territory available for distributors and manufacturer's representatives to handle paving expansion joint line.

Manufacturer of metal tie and spacer wishes to establish distributing points throughout the country.

Eastern manufacturer of grade-rippers, scrapers and road hoes has desirable territory open for distributors.

Manufacturer of asphalt ingredient, adaptable for use in the road or industrial field, is seeking representatives for desirable territory in various parts of the country.

Attractive territory open in states south and west of Chicago by manufacturer of cut to length, easily erected standardized steel highway bridges, for spans up to and including 40 ft. Product sells to highway commissioners and superintendents.

Manufacturer of Transverse Testing Machines desires to build up distribution organization in this country and abroad.

Several desirable states open. Wanted distributing organizations covering entire states by manufacturer of mechanical spreader.

Territory open in several states for representatives to handle grade-rippers, scrapers and plows.

Open territory in New York and New England states for aggressive distributor wishing to take on line of hoisting machinery and air compressors.

Balzer Machinery to Represent Byers in Far West

The Byers Machinery Company of Ravenna, Ohio, have recently appointed the Balzer Machinery Company as distributors of their line of excavators, shovels and draglines in Western Oregon and Washington. R. L. Balzer, head of the distributing company, has announced the appointment of H. L. Nilles as a member of the selling organization to specialize in the introduction of new equipment in the western territory. It is stated that the Balzer company will also represent the Marion Steam Shovel Company for whom Mr. Nilles was formerly Northwest manager.

Lakewood Engineering Company have combined the Columbus and Cleveland sales divisions which are now located at 520 Dublin Avenue, Columbus, Ohio.

Announcement

C. E. Ellsworth, C. E., has announced his resignation as chief engineer of the construction division of the National Lime Association of Washington, D. C. and the availability of his services to other organizations.

Pave and Save with ASPHALT

NEWBURYPORT TURNPIKE IN EASTERN MASSACHUSETTS

An old asphalt macadam pavement was widened on this portion with penetration macadam base and same type of surface. This road was built in 1922 and widened in 1928.



The Asphalt Institute presents as a sound highway program for 1931 the following basic considerations:

- 1 The surfacing of a large mileage of farm-to-market roads to connect with main highways.
- 2 The widening of present inadequate pavement widths by economical methods.
- 3 The waterproofing of earth, gravel and stone shoulders.
- 4 The general adoption of stage or progressive construction coordinated with traffic needs.
- 5 Full utilization of existing pavements or surfaces as bases for new wearing courses.
- 6 Waterproofing subgrades preparatory to laying new pavements or surfaces, irrespective of type.
- 7 Avoidance of dangerous and inadequate one lane pavements on any highway.
- 8 Confining gasoline taxes strictly to highway purposes.



FIFTH AVENUE AND 42nd STREET, NEW YORK CITY
—carrying the heaviest traffic of any street intersection in the United States. The asphalt pavement at this point carries a traffic upwards of 50,000 vehicles per day.

The Asphalt Institute invites inquiries for information as to practicable means of accomplishing these objects.

The ASPHALT INSTITUTE

A national institution not organized for profit but for constructive, educational and research activities. Representing 85% in volume of the asphalt producers in the United States and Canada.

801 SECOND AVENUE (at Forty-third Street), NEW YORK, N. Y.

Visit the Asphalt Institute Booth No. A-125 at the Road Show.



Please mention ROADS AND STREETS—it helps.

Who's Who

Among Manufacturers and Distributors in the
Field of Construction Equipment



MARTIN MADSEN
President
Madsen Iron Works
Huntington Park, Calif.



K. A. RICHARDSON
Manager
Madsen Iron Works
Huntington Park, Calif.



A. H. ZIEGLER
Chief Engineer
Madsen Iron Works
Huntington Park, Calif.



EDWARD R. BACON
President
American Tractor Co.
Oakland, Calif.



R. G. SMITH
President
American Bitumuls Company
San Francisco, Calif.



EDWIN F. HILL, JR.
Sales Manager
Transit Mixers, Inc.
San Francisco, Calif.



E. T. TULLER
President
Transit Mixers, Inc.
San Francisco, Calif.

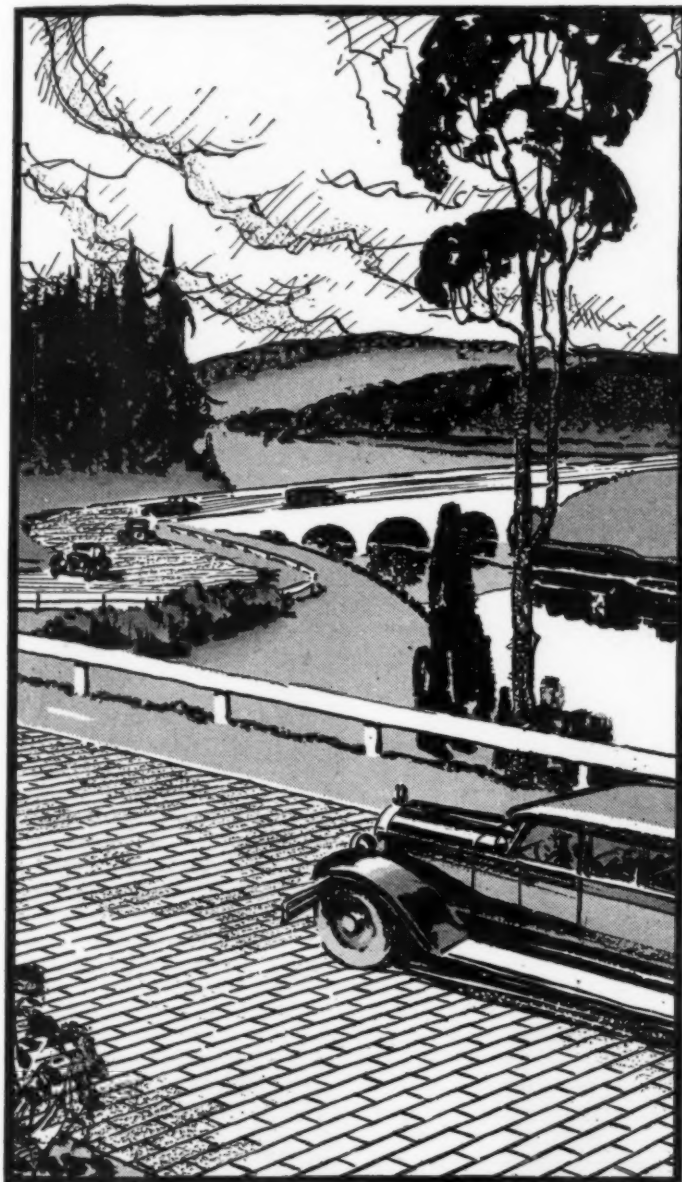


WINSTON F. STOODY
President
Stooddy Company
Whittier, Calif.



W. H. GOODWIN
Assistant Sales Manager
Caterpillar Tractor Co.
San Leandro, Calif.

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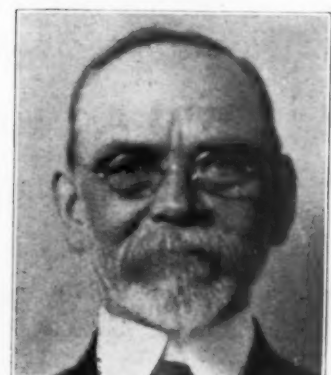
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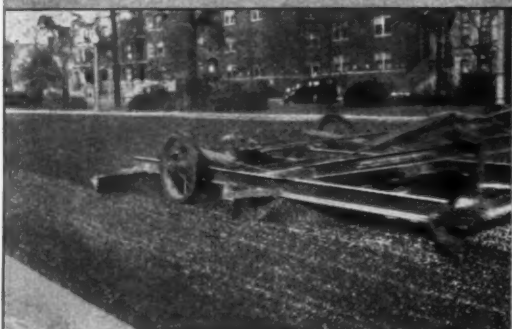


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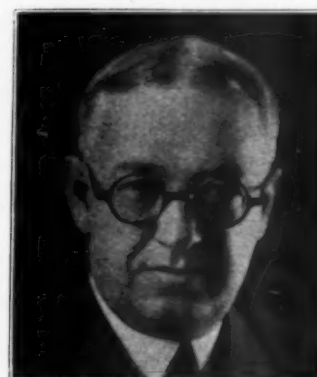
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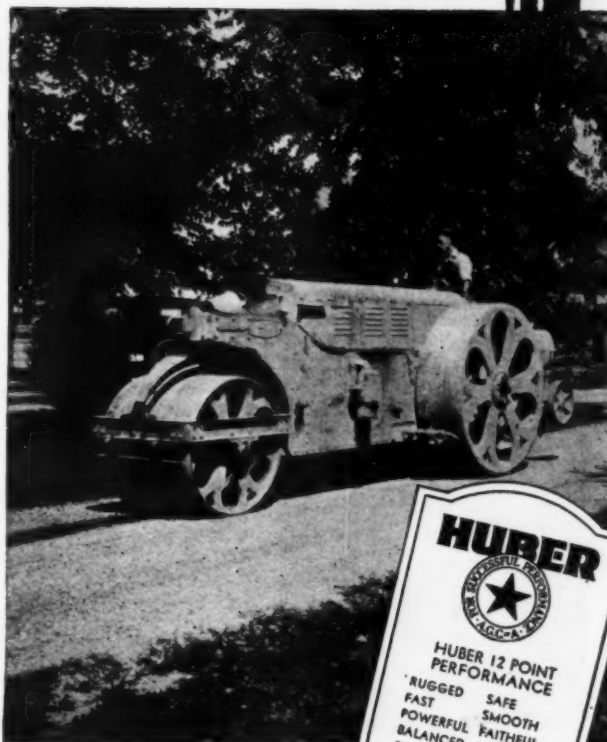
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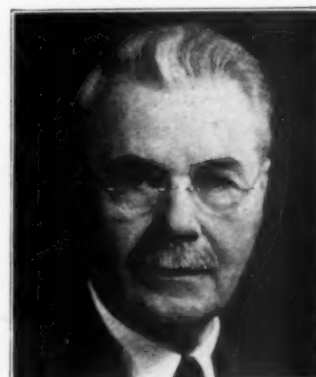
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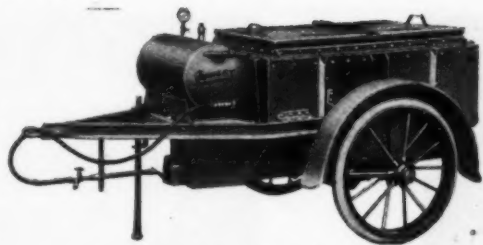
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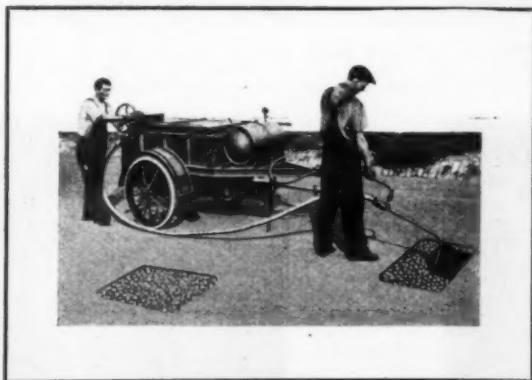
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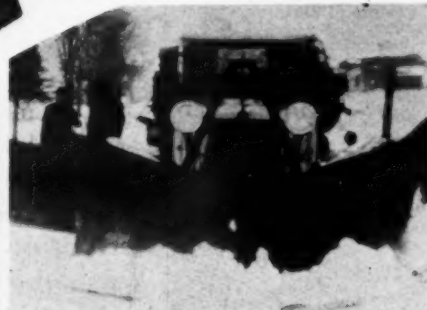
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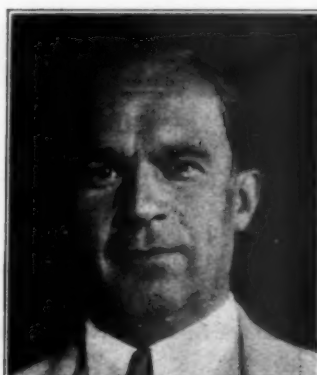
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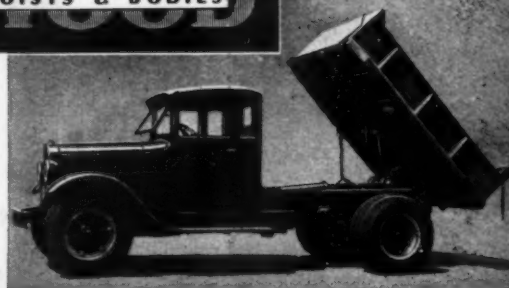
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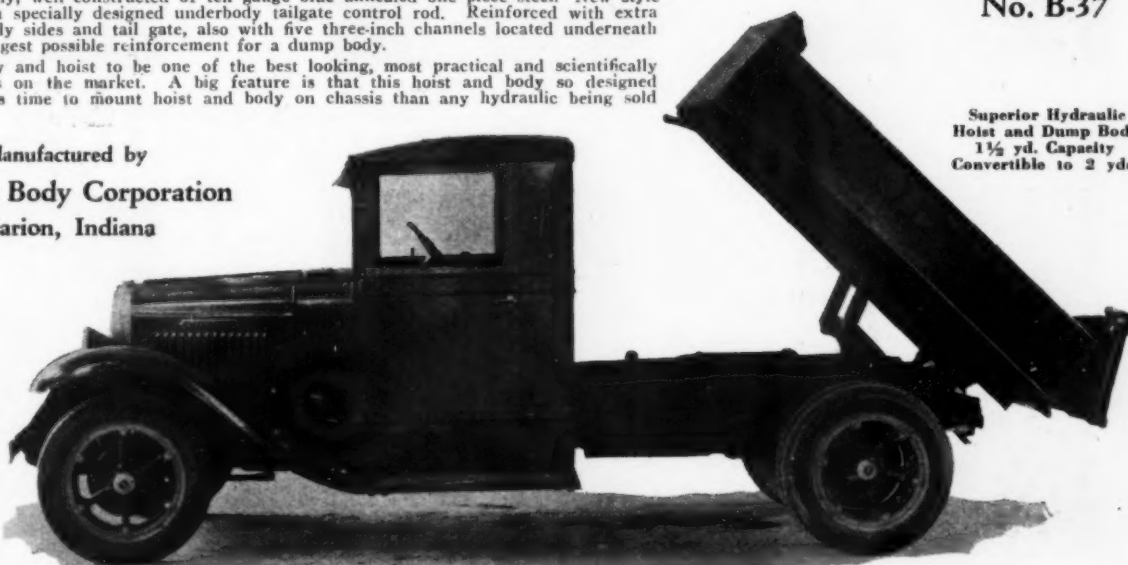
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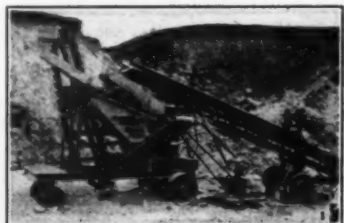
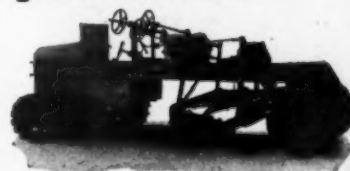


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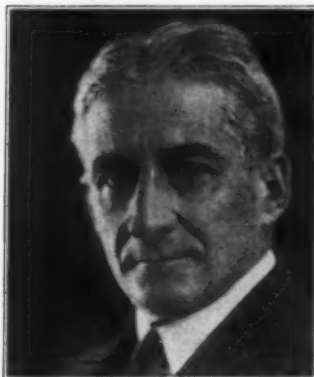
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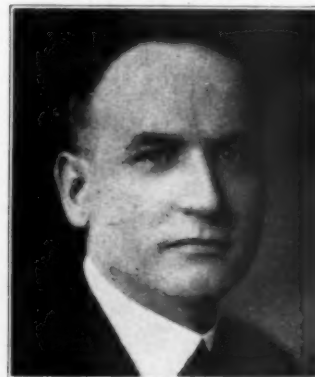
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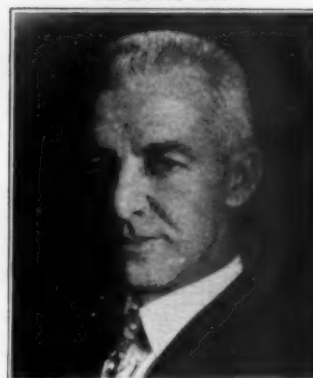
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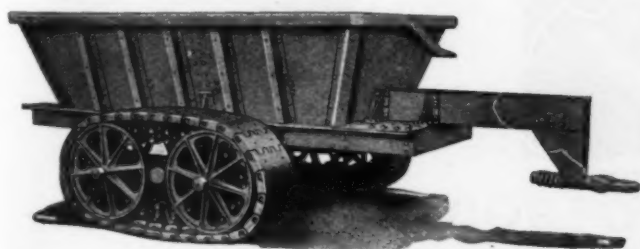


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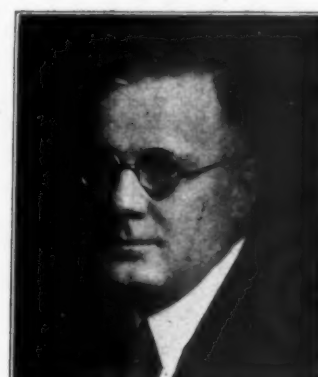
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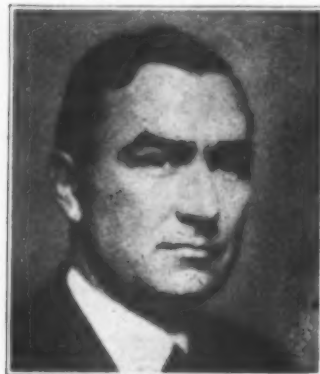
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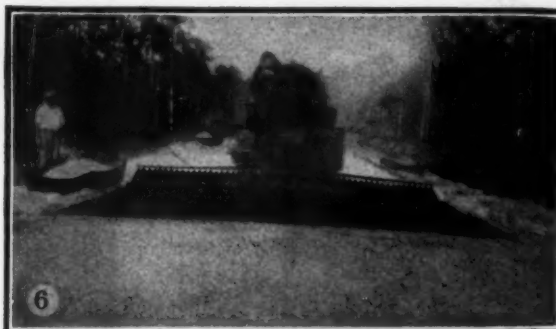
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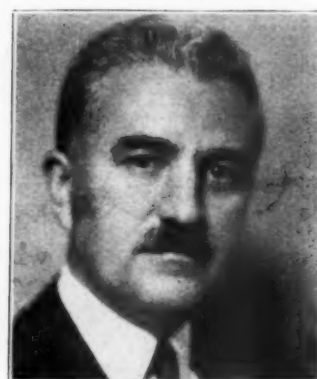
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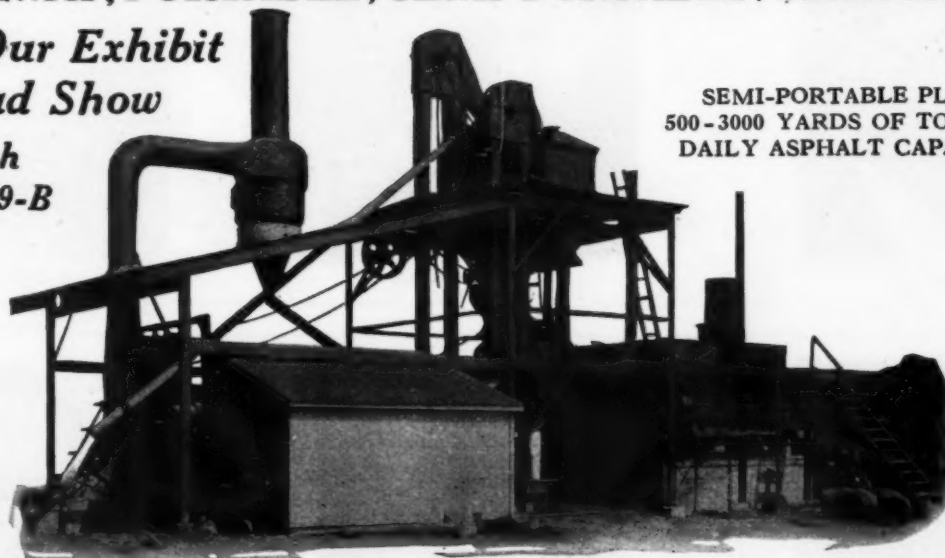
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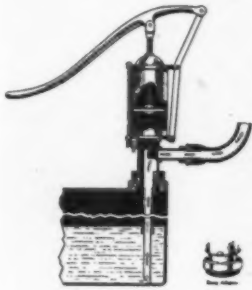
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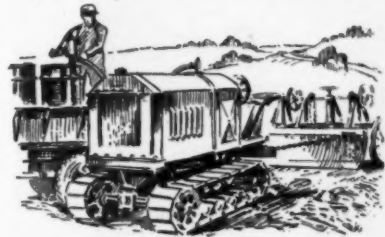
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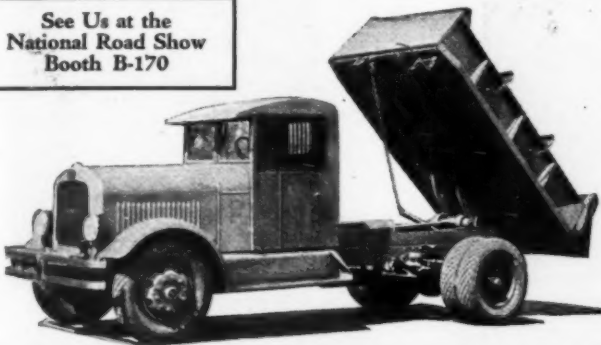
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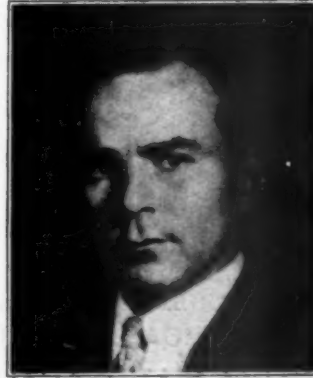
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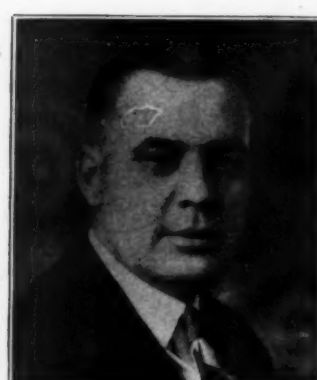
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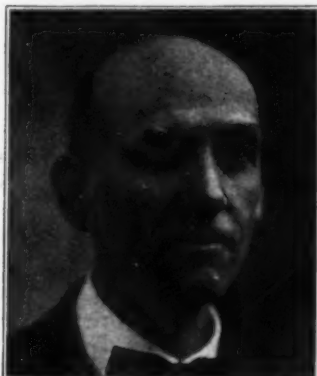
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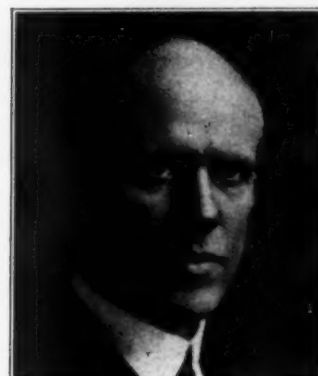
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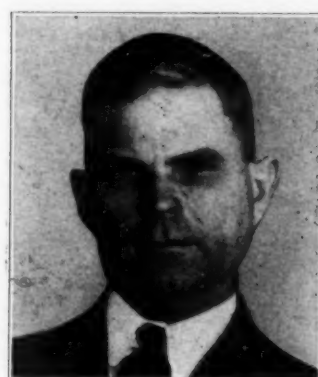
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